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Robert Mayer.

CHAPTERS ON

THE ART OF THINKING.

AND OTHER ESSAYS.

BY THE LATE

JAMES HINTON.

WITH AN INTRODUCTION BY SHADWORTH HODGSON.

EDITED BY C. H. HINTON.

LONDON:
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1879.

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PREFACE.

THE present volume is composed partly of papers which were found amongst the manuscripts left by my father in a form ready for publication, partly of essays which have appeared on various occasions in literary or scientific periodicals.

No use has been made of the greater mass of the manuscripts which exist, as they were intended to be entirely rewritten and rearranged before publication.

Nor have any extracts been given from a series of volumes which contain his work from 1859 to 1863 and again from 1869 to 1870. These volumes would form the most available source to whoever wished to make a study of the course and bearings of my father's inquiries, but are hardly adapted for general perusal, as they are more a record of his thoughts in the process and order of development than an exposition of the results at which he arrived.

In order to make their contents accessible, it is necessary to bring together into one parts which are often

separated by many pages, and to collate them with later and unprinted manuscripts. A book thus formed will, I hope, some time be produced.

Of the essays in this volume the two, "On the Bases of Morals" and "Professor Tyndall and the Religious Emotions," which appeared in the "Contemporary Review," taken together with the short paper entitled "Others' Needs," seem to me to give the best representation there is of the ethical portion of my father's writings.

Between pages 100 and 212 will be found a series of articles which are for the most part reprinted from the "Christian Spectator." Some of them were in the form of letters to the Editor, and when this was the case I have simply removed unnecessary paragraphs. Amongst them, on page 213, is an explanation of "The Mystery of Pain," contributed at the Editor's request shortly after the appearance of that book.

It is included here, as it places the scope and object of that work in a very clear light, and is the only available reference to a class of subjects which occupy great prominence in the manuscripts.

Although many of the essays from the "Christian Spectator" were written so long ago as 1860, it will be found, I believe, that they place in a very clear light a great many elements which were essential in the development of my father's later thoughts.

At the end of the volume will be found those amongst my father's scientific papers which seem to have a general interest, and at the same time not to be altogether disconnected with his philosophical views. Of the greater part of his writings on science I am not in a position to give a summary, nor would it be of general interest if I were, as they consist of papers on particular questions in medical science, for the most part on subjects connected with aural surgery.

To the introduction contributed by my father's friend, Mr. Shadworth Hodgson, I do not feel that I can add anything, nor do I feel that this is the place for any personal reminiscences of my own.

I cannot help remembering, however, one occasion on which the conversation turned on music. The idea was suggested that owing to the limited number of notes, and the unlimited number of compositions that were produced, a time would at last come when all the possible combinations would have been made, and all future attempts to compose would be simply repetitions of harmonies already exhausted. His remark was, that the man would some time come, breathed on by a new spirit, whose feeling would be much more nearly represented by saying, instead of "*All* music has been written," "No *music* has been written."

And so, on looking back, I cannot help recalling these words, for as I turn over the pages of this book what I

find there hardly seems to me the same as what I once heard.

Yet, if the whole purpose of the thoughts in this book may not be manifest, and although the spirit which animated them, and made them seem a different thing when they were spoken, has to be reconstructed, still I am sure that the reader will be able to gather from these pages a great portion of my father's life-work.

In order to show the impression which different minds received, I have appended, under the title of "Recollections," a few papers which are in each case the report either of single or of several conversations.

To the writers of these, and to Mr. Shadworth Hodgson, I must express my sincere thanks.

C. H. H.

CHELTENHAM, *October* 1878.

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INTRODUCTION.

I HAVE been asked to contribute some words by way of introduction to the present volume, which consists of papers, partly manuscript, partly republished, by one from whose hand, but a few short months ago,[1] we were hoping to welcome some fresh philosophical achievement, the planting of some new beacon far advanced into the surrounding gloom; but must now content ourselves with gathering together, soberly and sorrowfully, the fallen but still burning torches which strew the stages of a traversed road, that their radiance may not be wholly lost to us.

The task is one which I think I cannot better perform than by attempting to indicate the general direction of thought taken by their lamented author—the nature of the general problem which he set himself to solve—the place which speculations of this kind hold in the economy of human effort. It would be beyond the province of an introduction, as well as beyond my own powers, were I to attempt to estimate what success has been actually achieved within that direction and in that part of the general economy—what position and rank among philosophical and scientific authors will finally be assigned to James Hinton. That rank, I venture to anticipate, will be no mean one. The very direction of thought into which he struck, the mere method which he adopted,

[1] Written April 1876.

would suffice to secure him an honourable place. *In magnis voluisse sat est;* it is so, namely, in cases where the choice itself is one which can only have been made by a mind at once acute, energetic, and comprehensive.

A comprehensive mind is one that not only pursues various lines of thought, but pursues them in combination with each other, continually weighing the bearings of one upon another and of the whole upon each. And the present selection of papers brings out this character of comprehensiveness in a very marked way. They show us their author's mind at work simultaneously in three different directions; and have been accordingly classed, and their dates given wherever possible, under the three heads of general philosophy, physiology, and ethic. The union of the order according to time with the order according to subject serves to make manifest the unity of thought and method which underlies them all, the co-ordination which they have all received from the dominant desire of finding a supreme law of practice which should bring harmony out of discord in the various aims and actions of men.

But this dominant desire which rules throughout these papers is precisely the desire which most strongly and universally prevails in the world at large, which is pre-eminently the characteristic of the present age. In this point Hinton and the world are absolutely at one; he has but given expression to the wants now felt as the most urgent by the heart of universal humanity.

How long are mankind to continue in a condition of anarchy and discord, authority against experience and experience against authority, faith against reason and reason against faith, law against liberty and liberty against law? Nay, it is not a question of the continuance merely, but of the increase of anarchy; for the discord,

which was at first confined to the few, is now reaching the masses. Not that we are without a common widely accepted morality to steady us. This we have, and we cleave to it the more energetically because, like men in despair, we have as yet nothing else to cleave to. We have the moral habits and practices which custom and inheritance have bequeathed to us, and which an ancient creed has sanctioned—two guarantees for their continuance, one of fact, the other of theory. But of these, the theoretical and theological one is fast losing, even for the masses, what long has seemed to them its foundation in reason—is fast becoming universally a belief at variance with truth. This is the position of things; one of the two sources of common morality is decaying or decayed—decayed for advanced minds, decaying for all. We cannot trust to the other source *alone*. We must replace the theoretical one. We want an authoritative and a reasonable basis for the common morality.

Society has, in our days, again arrived at a crisis where it is called upon to undertake the tasks of adult age before that age has been fully reached. It is called upon to guide itself by reason before its reason is fully matured. For what is the age of mature reason in a society? The answer must surely be, that it is one at which the reason of the few most intelligent of its members can without hindrance govern the action of the whole society, just as, in an individual, reason is mature when the actions of the individual can be governed by it, his passions restrained, his purposes guided. It is one at which, if the individual goes wrong, he does so in spite of his better reason, not from the absence or the interception of its guidance.

But is a state analogous to this reached by any of the greater societies, that is, by any nation, at the present day? Assuredly not. It is a state, indeed, which they are all,

with more or less success, striving to attain, but which not one has reached. The obstacles are two. First, there is imperfect communication between the intelligent few and the masses; secondly, the intelligent few are at variance with each other on points of fundamental importance. There is neither an authoritative doctrine nor adequate means of diffusing any doctrine at all. And this is but another way of saying that the Churches have lost their authority. For these two functions, of announcing an authoritative doctrine and of diffusing it, are precisely those which the Churches once performed, and now increase the anarchy by insisting that they can perform still.

Of the two desiderata, the re-establishment of theoretical concord is incomparably the most urgent. Unless a theoretical concord is established, no provision for the diffusion of knowledge can do anything but increase the confusion. But this by no means implies that provision for diffusion should not be made without waiting for the complete advent of a doctrine. For, on the one hand, the diffusion itself may be itself a means of leading, through discussion, to concord; and, on the other hand, there are certain points in which, for some societies, concord may be held to be already attained, notwithstanding that these points are not yet combined into a system of truth.

It is at the re-establishment of theoretical concord that philosophy necessarily aims at the present day; it is in this direction that Hinton's writings have their chief value; and it is as contributions to this end that they must be judged. What, then, is the feature in his writings which makes them tend in this direction; what is the point which he is most concerned to establish as the pivot on which the whole of philosophy must turn if theoretical concord is to be established? It is this,—

the *emotional* nature of man must bear an equal part with his intellectual nature in determining his philosophical creed.

The importance of the emotions in philosophy may be thus stated. As the senses furnish us with the facts of the external world in which we live, which directly acts upon us, and to which we have to conform, so the emotions, which are the facts of our inner world, determine our reaction upon the external world of sense, are the ends which we employ the external world to realise for us, the guide of our efforts to mould it to our will. The moral world begins with the emotions, which may be described as those kinds of feeling which accompany *thoughts*, just as sensations are the kinds of feeling which accompany *perceptions of sense*. Pleasure and pain of sense are good and evil simply; but moral good and evil are respectively pleasure and pain of emotion—are a pleasure and pain judged by reference to an inner standard. And the perceptions we have of both kinds may be healthy or morbid, true or perverted, may lead us right or may lead us astray.

There are, in short, two great domains of feeling—sense and emotion, and both belong to the great kingdom of nature. We did not make our senses, neither did we make our emotions; but we can within certain limits modify both, and both by the same two methods,—one by modifying the external world, the other by modifying, which in this case is called educating, the faculties themselves. The world, so far as it is an object of thought, is also an object of emotion; and we can no more get rid of its having a *character* in this respect than we can get rid of its having *qualities* which sense perceives in it. It is a common error to imagine that when *we* are said to do anything, the thing done is wholly arbitrary, wholly

within our power to do or leave alone, wholly the result of choice. *We* are a part of nature, and *our* power is limited to certain comparatively small and slowly operating modifications of nature's course. The moral character of the world as an object of thought belongs wholly to nature and only partially to *us*, inasmuch as we ourselves are a part of nature. Ours is "an art which nature makes."

Until, then, the emotions, those inner sensations which are the key to the character of nature as a whole, are given their due weight and place in philosophy, philosophy cannot be at unity with itself. The mind of man will resist the imposition of a doctrine, however apparently scientific, which professes to be the whole truth without taking into account the moral or emotional side of human nature. Those are the truly comprehensive minds, those are the best philosophers, who insist on having not only the truth, but (as our witnesses' oath says), the whole truth, and nothing but the truth. Nor are they the worse for that, even in their character of men of science.

The decisive entrance of this principle, as an informing principle, into English philosophy, is due to one whose name will one day be recognised as the greatest which that philosophy can boast—Samuel Taylor Coleridge. Coleridge did not, indeed, express or announce the principle, but he acted on it; and he was the first to act on it here or elsewhere. The German writers of the same school show little or no trace of that emotional *motive* which led the intensely sensitive and imaginative Coleridge to adopt the philosophical doctrines common to them all. Reason, Intellectual Intuition, and the Ideas belonging to them, have with these writers an intellectual *content* as well as an intellectual *framework;* they treat man as having high moral and religious duties, prescribed by these ideas, in all relations of life; but they

do not regard him as a being in direct *emotional* relation with the Unseen. With Coleridge, on the contrary, this direct emotional relation is all in all. His poet nature made him introduce the emotional element into the very constitution of that nominally intellectual faculty which was with him, as it was with Kant, with Schelling, and with Hegel, the highest power of mind, the faculty of Reason. The reason was with him an emotional at least as much as it was an intellectual faculty. Whereas Kant had left it purely intellectual—its Ideas having in speculation only a regulative use, and in practical matters only a formal content, the "categorical imperative"—Coleridge ascribed to it a vision of concrete truths, the substance or matter of which received for him its whole value, not as it did for Schelling, from its enlightening the intellect, so much as from its power of touching the heart.

Coleridge took up from Kant and Schelling the distinction between the two intellectual faculties, Understanding and Reason, and made this the basis of his whole philosophy. But if we look at the comparison which he institutes between them in the "Aids to Reflection,"[1] we shall see that the difference *in kind* which he discovers comes from nothing but this, that he combines with his faculty of Reason the objects upon which it works, namely, the emotions, while he does not combine the corresponding objects, namely, sensations, with his faculty of Understanding. He contrasts them thus:—

"*Understanding.*

"1. Understanding is discursive.

"2. The Understanding in all its judgments refers to some other faculty as its ultimate authority.

"3. Understanding is the faculty of reflection.

[1] Vo'. i. p. 175, ed. 1848.

"*Reason.*

"1. Reason is fixed.

"2. The Reason in all its decisions appeals to itself as the ground and *substance* of their truth.

"3. Reason [is the faculty] of contemplation. Reason, indeed, is much nearer to Sense than to Understanding: for Reason (says our great Hooker) is a direct aspect of truth, an inward beholding, having a similar relation to the intelligible or spiritual as Sense has to the material or phenomenal."

The Reason, then, is with Coleridge *thought informed with emotion*. Of the two domains described above as dividing between them the kingdom of nature, Sense and Emotion, Coleridge takes Sense as separate from Understanding, while he does not see that Emotion might equally well be taken separately from Reason, nay, that it must be so if Reason and Understanding are to be fairly compared together. Understanding *minus* its objects, Reason *plus* its objects, are not fairly to be contrasted. Either both with their objects, and then the difference would seem to be due to the objects; or both without them, and then the difference *in kind* would vanish altogether. Then it would be discovered that there was no essential difference between Reason and Understanding, taken alike as purely intellectual processes. But the emotions had not in Coleridge's time been distinguished as a separate domain from the senses; indeed, it was mainly to Coleridge's own insistance on the attributes of Reason that they assumed that position in philosophy.

It would demand a long work of literary criticism to prove in detail the claim I have now advanced for Coleridge, still more to prove it in contrast with the great German writers of the same school; but in confirmation

of it take a single passage from the priceless "Biographia Literaria," where Coleridge is speaking of his early Quantock days, when he first set himself to philosophise in earnest, and "devoted his thoughts and studies to the foundations of religion and morals." "For a very long time, indeed, I could not reconcile personality with infinity; and my head was with Spinoza, though my whole heart remained with Paul and John."[1] There is the key to Coleridge—the head with Spinoza, the heart with Paul and John. Yes, and there, too, is the key to all philosophy in this country since his time, and what is more, to all philosophy everywhere in the future. The need of finding a system of thought which shall reconcile the phenomena and combine the claims of the head and of the heart—this is what philosophy aims at, and cannot rest till it be accomplished.

Here it is that we see Hinton's true place and function in philosophy. He is occupied in working out that problem which Coleridge proposed for solution. He is a hander-on of Coleridge's torch. Let us not be deceived by appearances. Whatever Coleridge may have said or thought of himself, however much of a theologian he was, the essentials of his doctrine are in no antagonism to the essentials of the English Lockian school. The addition of the domain of Emotion to the domain of Sense is not destruction but addition—the addition of a new domain of facts. The *quod non prius in sensu* receives the addition *aut in affectu*. The interpretation of the new facts belonging to *affectus* is another matter. Here Coleridge becomes a theologian; and his interpretation of the facts is, as we have seen, wrong from the first. And the traditional or Church theology, which that mistaken interpretation served for the moment to revivify, has

[1] Vol. i. p. 196, ed. 1817.

been ever since more and more parting company with any form of living and consistent philosophy. But precisely here it is that the Coleridgian philosophy requires correction by his successors; precisely here that the value of fresh interpreters is felt.

Principal Shairp, who has written of Coleridge with truer appreciation and profounder insight than any other known to me, says, after remarking on the absence at the present day of any acknowledged authority speaking from the spiritual side of philosophy: "Whenever such a thinker shall arise, he will have to take up the work which Coleridge left incomplete, and by more patent analysis, and more systematic exposition of the spiritual element which enters into all thought and all objects of thought, to make good as reasoned truth the ground which Coleridge reached only by far-reaching but fragmentary intuition."[1] These words, I think, may be fairly claimed as applicable to James Hinton, although he may not have been himself aware of his intellectual relationship to the elder philosopher, still less have worked in conscious continuation of him. At least, judging from myself, Hinton's work gave me a new, and, I venture to think, a deeper insight into Coleridge's.

Coleridge and Hinton were both of them Christian philosophers; but a change has been wrought in the interval in their common Christian philosophy—a change which consists in this, that the theological vesture which was its predominant feature in Coleridge has in Hinton given place to the emotional body by which it was created, worn, and finally outgrown. What was implicit in Coleridge became explicit in Hinton; there was a "more systematic exposition of the spiritual element;" and

[1] Studies in Poetry and Philosophy, p. 236, 2d ed., Samuel Taylor Coleridge.

much of what was explicit in Coleridge fell away in consequence. *Eripitur persona, manet res.* The emotional nature of man is that by which he is a religious being, that by which, therefore, he is a Christian. Let us hear Mr. Matthew Arnold on this point, who is himself a fellow-labourer in the same direction, and who, if he had not so much of the *philosophe malgré lui* about him, would stand at the head of philosophy in this country. "The power of Christianity has been in the immense emotion which it has excited, in its engaging, for the government of man's conduct, the mighty forces of love, reverence, gratitude, hope, pity, and awe—all that host of allies which Wordsworth includes under the one name of *imagination*, when he says that in the uprooting of old thoughts and old rules we must still always ask—

> 'Survives *imagination*, to the change
> Superior? Help to virtue does she give?
> If not, O mortals, better cease to live.'"

This, then, is the light by which the papers comprised in the present volume should be read, if we would judge fairly either of their significance or of the results which they achieve. The unity of nature is the thought which underlies them as a whole. The operations which have mind and those which have matter for their field are parts of one system of operations; and just because they are parts of a single whole do they recall and seem to repeat each other when each kind is separately examined. "The Analogy between Organic and Mental Life," at page 91, is an instance of what I mean. Why should "Mind" and "Matter" have been set up as antagonistic powers, and made the watchwords of hostile schools? Surely such antagonism is a relic of the infancy of the race, and destined to pass away under a larger grasp and

co-ordination of facts. For why do we discover analogies in material processes to the workings of thought? Is it not because our minds are themselves *dependent upon* material processes in the organism, continuous with the material processes in external things? Is it not *also* and at the same time because external things *consist of* sense qualities and emotion qualities, that is, consist of the very things which our minds consist of?

Thus the unity in our philosophical conceptions requires unity in the object of those conceptions, requires a single nature, or universe of things, as the objective counterpart of a single self-consistent philosophy. And this is the key to, or logical transition between, those two doctrines of Hinton's, which at first sight seem, if not repugnant, yet at best only superficially resemblant—the doctrine that the material world is not a world of dead or inert matter, but animated, and the doctrine that the moral and emotional nature of *man* gives us an insight into the real nature and character of the world at large.

That inanimate matter is inanimate in appearance only; that animate matter is a large category, including under it as a case that which we know as living organisms, and as a still more special case that which we know as inanimate matter or inorganic substances;—this seems to be a doctrine belonging in any case, whether it be true or untrue, to the domain of physic and physiology. On the other hand, the doctrine that the emotional nature of man gives us an insight into the nature of the world at large, seems to be one that belongs to ethic, religion, or general philosophy, and to have no bearing on the physical world which the special sciences investigate.

But when we reflect that the unity of philosophical conceptions requires unity in their objective counterpart, the universe of nature, then it becomes evident that if

we start with the latter of the two doctrines, then *some such* complement as that supplied by the former of them is inevitably required. The dependence of the highest mental perceptions upon physical changes in the nervous organism unifies the two domains of physiology and ethic. The moral world and the physiological are *of a piece.* But the physiological and the physical, the organic and the inorganic, are of a piece also. The only question is, in what way to interpret this latter unity. For the belonging of them both to a single great whole requires us to find some sense in which the more complex force, the physiological, is a condition upon which the less complex force, the physical, depends, as well as *vice versa*, whether it be as an efficient or as a final condition, as a condition precedent or a condition subsequent, in order of actual development in time. It requires us to conceive, as possible at least, the *converse* of that process of evolution with which Mr. Spencer and others have familiarised us; it requires us to conceive life as being, possibly at least, the condition *existendi* of the merely physical modes of motion, and as itself dependent in turn upon some still more complex forces, the special nature of which we have not faculties to apprehend.

But whether this converse process of evolution is also to be conceived as actual, whether the physical and inorganic forces are a part of an actually existing whole of physiological and organic forces, instead of being the condition upon which and out of which they are subsequently developed,—this I apprehend was to Hinton a matter of small importance comparatively to the philosophical doctrine of the unity of nature resulting from a due regard to the emotional nature of man. With him this view carried with it a reversal of the current notion that man was morally greater than nature, the top of

creation, the "roof and crown of things." It meant no less than this: What a small and puny creature is man, who, instead of being, as he supposed, the one moral thing in nature, is now becoming aware that nature, not he, is the moral being; having before attributed to himself, to the entity his soul, those moral perceptions which were his by nature's gift, which he held only in right of his being a part of nature, and which were really eyes by which he might see what nature was, means of discovery of nature's majesty, not the foam and froth of sportive fancy.

Like all true philosophers, Hinton restores the conception of the whole to its just rights over against the conception of the parts. The two conceptions are correlative, and can never be rightfully dissevered. And the expression, Whole and Parts, is but another way of saying, Final and Efficient Cause. The whole of anything is its final cause, the parts are the chain of conditions which build it up. And the whole or final cause of anything is that which alone enables us to judge of the character of its parts, which alone gives a character to the parts composing it. Some would banish final causes from science, some even from philosophy; but as from the latter at least they can be banished only by mistake of what they really are and mean, so their return is inevitable the moment any man begins to philosophise with genuine insight. And Hinton is marked as a born philosopher by nothing more decisively than by the constant and almost involuntary use which he makes of this conception as a principle of thought—by the way in which it is, if I may say so, ingrained in the texture of his speculations.

SHADWORTH H. HODGSON.

COLLECTED PAPERS OF THE LATE JAMES HINTON.

I.

CHAPTERS FROM THE ART OF THINKING

(1872. *Unpublished*).

CHAPTER I.

CORRECTION OF THE PREMISS.

ONE of the best known modes of progress in knowledge is that which has received the name of the *reductio ad absurdum*, or *correction of the premiss:* that is, the fundamental thought which is taken as the starting-point, in any given case, being imperfect, false conclusions are rendered necessary; and by the casting aside of these conclusions a truer fundamental thought is brought in. In the following remarks I shall endeavour to show that the correction of the premiss is the mode in which both the intellectual and the moral life of the human race advance.

I. In respect to the intellectual life, man's advance is from ignorance; and from ignorance to knowledge (apart from direct instruction from without) there is no other

path than through the correction of the premiss. This is the necessary form of the *attainment* of knowledge.[1]

If the reader will recall any ordinary mental process, he will perceive that when, in any case, he is ignorant of any essential circumstance, the conclusions he draws will not be true. The omission of truth, if any process of reasoning takes place, necessarily involves us in error. A person, for example, not knowing the existence of steam, would necessarily suppose false powers in the things moved by it. A man not knowing the weight of the atmosphere, by which lighter bodies are raised, must attribute to a balloon a power of 'rising' that it does not possess. Savages, not knowing eclipses, have inferred devouring monsters. It is impossible that reasoning in ignorance should have any other effect than that of leading us to erroneous conclusions. Nor is the case different if, instead of reasoning, or together with it, observation be employed. Observation, based upon assumptions that include too little, leads also necessarily to error. So chemists, formerly, observing with all exactness the effect of *burning*, but without knowing that oxygen unites with the burning body, and that part of it is carried off in invisible gas, thought that something which they called *phlogiston* was given off by bodies in burning. The things we can directly observe are, at the utmost, but parts; and we cannot put them truthfully together while the parts which we cannot directly observe are wanting.

[1] One or two qualifications, not at all affecting the proposition, need perhaps to be made: thus (1) When the premiss has been corrected in any particular case, there lies open a course, more or less fruitful, of observation and reasoning upon the new premiss thus acquired, before there arises the need for a repetition of the process. (2) A certain knowledge we may be said to possess without any process of acquiring it at all; namely, the knowledge that we have certain sensations. (3) It may be held by some that there is also a certain further amount of 'instinctive' knowledge possessed by man which is exempt from this law, not having to be acquired.

Now, in ordinary affairs, no one either doubts or complains of the law that if he does not know the facts he falls into erroneous conclusions. Reason would not exist if it were otherwise. And if we turn to wider spheres, it is evidently as little desirable, and as little possible, that ignorance should not lead to error. It is by means of the error that the ignorance is banished; by means of the false conclusions the premiss is rendered more complete, for by them men are driven to seek a truer thought. On how grand a scale this method of learning has been carried out, it needs but slight acquaintance with science to perceive. All the ancient astronomy, before the discovery of the earth's motion, was one magnificent demonstration in this form; ignorance of that one fact compelled it to be so.

But it is needless to multiply instances. Absence of knowledge has for its inevitable fruit this result: that the right exercise of our faculties leads, at first, not to true but to false conclusions. The only means whereby our progress to knowledge can be made harmonious is in frankly recognising and accepting this law of our life. For, be it ever so well understood, if it be not consciously accepted in its application to every problem which nature presents to us, we turn against ourselves the very powers by which we might advance.

Conceive a master carrying a class, in good faith and with a view to their own real discovery of the truth, through a *reductio ad absurdum:* we perceive all the pupils starting from a common false conviction (for ignorance always feels itself to be knowledge); then, as the master's good logic or good observation carried them to the false conclusion, inevitably the class would divide itself into two portions: one affirming the false conclusion because supported by sound reasoning or clear evi-

dence; the other feeling the conclusion to be false, and insisting therefore on finding some flaw in the demonstration. Strife and opposition would come, and an endeavour to wrest from one another that which each maintained; a strife which must continue until the meaning of the process was perceived, and the premiss corrected. The pupils would divide themselves into two sides, according as they felt most the validity of the *process* by which the false result was proved, or the unreason of the result itself. In any ordinary case, this condition of strife, of course, would last but a short time; but if the problem were really one of great complexity, capable of being solved only by long-continued effort, and especially if demanding the joint effort of many minds, it is evident that (the nature of the process not being consciously recognised—the master giving no hint) this condition of strife and opposition might go on very long. Now mankind are situated thus as a class before nature; she is our schoolmistress, we are her pupils; she carries us through one *reductio ad absurdum* after another, *and she gives us no hint.*

So, if we overlook this law, we turn our efforts into a false direction. The true use of the results that are gained by our very best efforts, on a starting-point that is incomplete, consists not in their being held, but in their being given up in the right way. To discover that right way of giving up even the very best results we could attain is man's true task—the task that perpetually comes to him, and must come to him again and again, so long as his knowledge remains incomplete, and his powers of perceiving limited. Our true end is to banish the ignorance within, and attain a true starting-point; and if we do not thoroughly accept it, we divide into hostile camps the powers which nature gave us for

mutual aid, and waste in fruitless fighting energies which, if we perceived our task aright, would be found to be each other's complements.

This is perfectly simple. There is certainly nothing in what has been said that is not entirely well known; but is it fairly applied in any relation of human thought? Simple as it is, its consequences are very great. One of these is, that in every case we are bound to ask not only whether the forces which move us are those of truth, but whether the basis on which they operate is also true. Nature calls us, in order to attain true knowledge, to regard two things; not only whether our conclusions are truly drawn, but whether the premisses from which we draw them are also true: but we tend to content ourselves with regarding one of these alone. When we perceive that a power of truth is leading us—clear reason or obvious fact—it seems to us that we fulfil all our duty if we follow it; a duty, indeed, we do thus fulfil, but it is only half. Truth on a basis of ignorance means not truth, but error. We must be prepared for this.

Another result of this nature of learning is, that the true right always comes to us in the form of giving up right. For the conclusions imposed on us by sound reason or true observation, while there is ignorance in the basis, though they are false, come to us in the form of truth. Ignorance within imposes on man a false law —the law of thinking according to the appearances: a law he cannot disobey, yet in the obeying of which no true duty is done; in yielding to truth he enacts falsehood; his right is a wrong right, his truth a false truth. In respect to knowledge, absence within means false rights without.

Now to this cause is due the chief part of the difficulty that is found in the advance of truth. It

arises from the demand, that is inevitable in *new* knowledge, for a letting go of that which has been enforced upon the mind by proofs to which the mind was bound to submit. Evidently this is a much harder task than merely yielding to proof, and consenting to accept evidence, and give up prepossessions. Difficult as this demand may be to minds constituted as ours are, it is a difficulty vastly inferior to that of abandoning opinions to which not prejudice or indolence has inclined us, but which our best zeal, our most rigid accuracy, even in spite of our own inclinations, it may be, have compelled us. Truth identifies itself in the soul of man, and rightly, with the highest moral obligation: to give up what truth has evidently and consciously compelled upon us—and the more if it be a thing distasteful to us, and calling on us for restraint of feelings we tend to indulge—affects the soul as a crime. This it is that has made the advance of knowledge so slow in times past; has embittered it with anger, stained it with blood. This: that ignorance imposes a *false right.* Not for follies, prejudices, indolence, indifference, have men striven against their brothers; but for the voice of God within their souls; for that which was most precious; for which, if they had not striven to the utmost, they had lost more than all knowledge could repay.

But also this fact, that *the* difficulty in the advance of knowledge lies in the demand it makes for the giving up of that which the pursuit of truth has imposed, and relaxing the grasp on that which has inevitably identified itself with right; this fact gives absolute assurance of the prevalence of truth. If that which opposed it were prejudice, or indolence, or any form of desire for ill, then it might wage a doubtful strife. Perchance man's evil (though far be it from us to believe it possible) might

have been too strong. But since what most opposes truth is a false thought of truth itself, truth cannot fail to triumph. The powers that oppose it are its own; casting it down, they bear it up; its seeming enemies yield up their own life to make it live. For this submission of man's soul to truth, which in ignorance gives the false truth its power, is that which ensures the yielding of the ignorance when the choice is fairly brought before man's mind. The false truths gain their power only by the ignorance which perverts truth to falsity; and when habit ceases to invest them with this usurped dominion, there is no more a contest to be waged.

Thus, in so far as our advance consists in the gaining of a completer starting-point, this consequence is involved: the true attainment of knowledge means that that which was a duty becomes no more a duty. Our learning must have this character whenever it fulfils our chief requirement, and penetrates deeper into regions of ignorance unassailed before. It is essentially a deliverance, a setting free. Because the character, above all, of ignorance is that it is a binder of bonds, an imposer of falsity with the outside characters of truth; falsity against which we struggle in vain, while the ignorance is still within us, because ignorance perverts the very power of truth to enchain us, and yet against which man struggles with absolute success, because through his very obedience his deliverance is wrought.

This becomes more evident when the various forces which are engaged in a correction of the premiss are considered. In its most usual form it has been a strife between sense and reason as to which shall rule, based upon the fact that our sense-perception is always a perception of *appearances*. Now, it is not the nature of appearances to be in accordance with the demands of the

reason; on various grounds it is impossible that they should be. Among the chief of these is, that our perception by sense is extremely partial. Hence comes, as before remarked, the appearance of numerous isolated forces in nature, instead of one force in changing form. And since, if the whole be rational, that is itself a reason against isolated fragments, put together as we may happen to perceive them, being rational, it is evident that any arrangement of the appearances alone will be opposed to the reason. However much of reason may be employed in the arrangement, it will still be so. The absence of reason involved in their partialness cannot be eliminated, but only for a time concealed. A thought that is conformed to the appearances (or sense-perceptions), therefore, inevitably lays bonds on man; it lays bonds upon his reason. And the solving of the *reductio ad absurdum* thus instituted consists in the rightful assertion of the claims of reason over those of sense; not crushing them, nor putting them aside, but fulfilling them, by the recognition of the unperceived elements, of which sense had given no account. So far the correction of the premiss is the introduction into our thought of some element unperceived by sense.

Thus it follows also that the history of human advance is by no means one of simple continuous progress, but presents a series of revolutions. Again and again it presents to us a process more or less long, apparently tending to one end, but resulting in another, and in one also altogether unexpected; necessarily unexpected, and even striven against, while the universal operation of this law is overlooked. That which *experience* teaches when we read it truly, is not that the thoughts which man has had will continue to be his, but that in everything in which a great and fundamental revolution *has not* already

occurred, such a revolution will certainly occur in the future. In respect to thought, nothing is stable that has not undergone this radical change—of receiving a new starting-point. The true lesson of experience teaches us to expect it, even as reason shows us its necessity.

And reason and experience also alike exhibit to us the characters which mark the stages of the process. A correction of the premiss involves that good reasoning and sound evidence—a *process* altogether valid—lead to *results* that cannot be accepted. The process good, the results untrue. It is the embodiment, in fact, of the words: "Either make the tree good and his fruit good, or else the tree evil and his fruit evil." It is nature's law that each tree—all acted upon alike by her good forces—brings forth fruits after his kind. The approaching completion of a correction of the premiss is marked especially by this—that good processes, actions dictated and guided perfectly by right, inferences sound in logic, observations of perfect honesty and skill, lead to conclusions that are intolerable to the reason; so that strife and doubt arise, and, above all, a suspicion that true knowledge is impossible. It has all the appearance of a failure and limitation of our faculties; for they are obviously set against themselves. Before the crisis comes a lull; before the revelation of the new knowledge, despondency. What experience truly teaches us to expect is great and sudden changes; the attainment of new perceptions of facts unperceived before, which shall give new bases to all our thoughts; and these fundamental changes preceded by special strife and mistrust of our powers.

II. And in the moral life, is it not to the full as visible that the law of man's advance is the correction of his starting-point? For what is more evident than that he

begins with absence of the true emotions—*with moral ignorance?* and what more visible in the whole course of his history than that his very efforts after good have led him into evil? For this is the sadness and "mystery" of human life, the thing that most tends to sink us in despair: not that evil is so strong, but that such a blight seems to attend also the very seeking after good. The very powers on which we must rely seem to play us false; not only evil has brought evil, but effort for right itself has ended in calamity, even in corruption. But this is the very process whereby a correction of the premiss is wrought out. It comes by man being compelled to open his eyes afresh, and regard more things; compelled to say, "It is true that right, to me, as I have been feeling and acting, has meant *these things;* but I must have a different thought, a different feeling, that right may no more mean these things to me." This is the problem of the correction of the premiss: to fulfil the condition of right no more meaning to us that which it has meant; of *beginning* so that duties which we could not have put aside before become no more our duties. "Our fathers said that on this mountain was the place where we should worship God; you say it is Jerusalem. Where must we worship? How far must we travel? what trouble undergo?" There is no *where;* let but the soul worship, and there lies no toil upon the body.

But thus we see that, no less than in the intellectual life, the moral and religious life must also have been a strife, a battle: not of evil and good alone, but one in which good must have seemed divided against itself—a truer right calling for the giving up of that which right itself had brought. For in respect to right also there lies on us a twofold demand, and we are prone to recognise but one and to ignore the other. Two demands lie on us

—not only to see that we follow that which right enforces, but to see also that our right also operates on a true basis. This latter obligation man leaves unfulfilled long after he has learnt to accept, and earnestly try to fulfil, the former. For very, very long he is content to say, "Right means this to me, and I will do it," before he will ask himself, "Is my soul truly right within, and if it were so, would right to me mean this?" And many and most disastrous evils he endures, never suspecting that his right can be in fault, before he is driven to ask, "Ought not right to me to be a different thing?" But God has so ordained his life that he cannot put the question away for ever, not even in the things he feels most sure of and counts most sacred.

For, indeed, the more intense his feeling of right in the things that right on an imperfect basis brings, the more holy, necessary, and utterly beyond profanation he feels them, so much the more potent on his soul is the demand God makes for him to let them go: the greater and deeper the change that must accompany the loosing of his grasp upon them.

And what the power is by which this change is to be wrought we need not ask, for it is shown us. How sacred must the Jews have thought resting on the Sabbath day, when they would let men suffer, die perchance, rather than it be broken? But there was one thing more sacred. The power that God sends against the rights that a false condition of the soul imposes is the needs of our fellow-men. By these He teaches us what the service is that He demands; how deep it goes into the desires; exacting from the soul nothing less than such a turning of its thought to others that its service has no need of rigid forms in which to clothe itself, but is free to follow wheresoever, by human want, His will is revealed. For,

in the moral life, the falsity in the starting-point is that others are not present *from the first* in our regard, so that our very goodness, our very worship, centre about ourselves. This makes our righteousness self-righteousness, our virtue a self-virtue; binds us to deeds for goodness' sake that are not one with service to our fellows.

It were an infinite joy if this law were true of our life. For there are two characters that belong of necessity to a correction of the starting-point. One is, that as soon as it is understood, the task is already done. The difficulty lies not in making the correction, but in the discovery that it is needed; the task and labour are in working out the false rights; the substitution for them of the more right beginning is, not labour, but deliverance. By its very nature, the truer right, the corrected premiss, is always the *easier* thing; it is at once more and easier, a better achievement and less toil. It is an entering into rest, the want that imposed the toil having been supplied. Other men labour, and those to whose eyes it is given to see that what they need is a truer beginning, reap the fruits.

And there is an infinite joy again in this, that though the *working out* of the correction of a premiss is a process of darkness, a very mystery of evil, compelling strife, and making peace impossible in spite of all desire; yet when once its meaning is understood all is changed: a new light breaks over the past, a new spirit descends into the present. The strife ceases; a meaning and end become visible in every part; an assured victory is made manifest in each defeat.

NOTE.—I have said that, in the intellectual life of man, the correction of the premiss is the introduction into our thought of some element unperceived by sense.

We may give perhaps to this fact another form of

expression. It has now become customary to say that our perception is modified by "subjective" elements: that is, that something within us affects our perceiving, and causes that of which we are conscious to be different from that which truly exists. In so far as sense is concerned, we see that this "subjective element"—or that which is from ourselves—is, that there are things which we do not perceive; or that there is more in that which exists than our perception includes. That is, the "subjective element" is a non-perception; or, to speak more generally, the subjective element, so far as we have knowledge of its nature, is a *negative*. The advance from falsity to truth is by a casting out of a negation or of a non-perception: that is, by our coming to perceive more fully. Now there is at least strong probability that, in this instance, of the senses as compared with the reason, there is shown to us the nature of the difference of our perception from the truth in every case: namely, that it differs by a negative—by that which answers to a non-perception. The correction of the premiss, then, we may define as the casting out of a non-perception: and it is effected either by the reason casting off bonds laid on it by the senses, through incomplete perception on their part, or by some process parallel to this.*

* I do not take into account the assumed introduction of *light* by the eye, or of *sound* by the ear, &c.; because these are by no means established to be subjective. The resolution of colour and sound, and other sensations of our own, into motion, is simply putting the impressions of one sense for those of another; and is done only because the latter furnishes convenient formulæ for universal application. Expressing all the phenomena of nature in terms of motion is like reducing incommensurable fractions to a common term; but it neither is, nor now professes to be, a truer apprehension. Whether our perceptions by ear, eye, taste, smell, &c., or those by touch, be the truer, remains an open question; and it is evident that those of touch, as involving exertion, whereby alone there comes to us the sensation of *force*, are presumably those which are most modified.

CHAPTER II.

OF PROOF.

OTHER results follow from the law that the advance of knowledge is by a correcting of the starting-point, but before considering them, it may be better to inquire what we mean when we say of any assertion that it is *proved.*

When we wish to bring another person to any opinion we adduce "arguments." These arguments are of two kinds—either direct evidence of the thing affirmed, or thoughts which make it difficult for any other opinion to be held. Now, direct evidence alone cannot amount to proof unless it be also shown that no other explanation of the appearances is possible. Until tested in this way, any opinion is plausible or probable only, never proved. To hold it proved would be to place ourselves at the mercy of our own impressions, and debar ourselves from supplying what might be wanting in them. Proof depends upon the testing of our thought in every direction, and finding that, of all ways possible to be supposed, the one affirmed alone is possible to be held. When, then, in argument we seek to make another's opinion agree with our own, what do we do? We bring to his mind thoughts, ideas, facts, which oppose his former thought: we do the very same thing that we do when we seek to direct the motion of a moving body; we apply *resistances* to its motion in all directions but that which we desire. So we apply "resistances" to thought; that is, we adduce opposing thoughts. We cannot think against another thought without having to overcome the resistance of

that thought; and amid conflicting thoughts, that one prevails to which there is least thought opposed. The reason we cannot think that two and two are five is, that we have a thought which opposes it—that two and two are four. The thought recoils from "two and two are five," as a ball recoils from a wall; there is an absolute resistance to it. In whatsoever direction thought is least resisted, in that direction it goes. It is no question of will or choice. We think that the whole is greater than the part; therefore we cannot think the part equal to the whole. Take the former thought away, and we no more are unable to think the part equal to the whole. Why should we not? So we are compelled to the conclusion of a syllogism, simply because the established general proposition *resists* a particular opposed to it. Thinking all men are mortal, I cannot think one man is not. That thought is resisted: the opposite one has nothing to resist it; and my thought takes the direction, of course, in which it is not resisted.

This, then, is what we mean by proof: the term simply expresses the fact that thought takes the direction of least opposing thought; that is, *of least resistance.* Thought takes the direction of least resistance; and to our consciousness of this fact in particular instances we gave the name of proof. The word expresses our feeling that our thought does go, will go, without possibility of forbidding on our part, in one direction, and not in any other; that is, in any other it is more resisted (by other thoughts). When a man is conscious of this fact, he says, if he be hasty in judging, "This is proved;" if he be more considerate, he says, "So far as I can see, this is proved."

For it is clear that this perception of ours, that our thought is more resisted in every other direction than in

one, establishes nothing as to truth. Whether the direction in which our thought, being least resisted, is compelled to move be the true direction or not, depends obviously on the question whether all the elements which should direct our thought are present to our minds. Our consciousness of the necessity of our thought—that is, our feeling of proof—is the same whether this be so or not. Non-recognition of this fact, and taking the feeling of assurance for evidence, is the great and chief characteristic of ignorance; the escape from it is the first sign of approaching knowledge: the sensation of assurance means just as much as the sensation of being at rest means, and no more. It is *equally* compatible with the truth and untruth to the fact. But this does not mean, of course, that there is no test of truth. Our thought is true when all the elements which concern it are present to the mind, and do their part in directing its operation. This is the case with mathematical truth, for instance. That two straight lines cannot enclose a space is "proved" simply because we, having a certain thought of straight lines, cannot against that think a contrary one; but it is *true* because it is certain that there are no other elements which belong to the case, and which are not present to our thought. And this is certain because we ourselves are the makers, or at least the definers, of the ideas with which we are dealing. All that concerns the thought of straight lines is certainly present to our minds, because our own minds determine the idea of the straight line; we know there is nothing left out because we deal only with what we put in. So with all other ideas which we ourselves strictly define, and by defining, limit; we make a completeness in thought of which we reap the fruits in an assurance of truth. But it is clear that if, besides what we know of straight lines, they might also have other

properties *affecting their power to enclose space*, which we do not know, we could not say that the impossibility of their enclosing space was *true*. Unknown facts might show it not to be true. But we know there are no other facts which do affect this question, because we look back to the whole origin of the idea, and perceive that it is one of our own construction, and that, therefore, there is in it nothing bearing on that point which we do not know. By a similar process of defining we can give ourselves the same assurance of *truth* in respect to anything. Define *motion* as that which is produced or stopped by *force*, and it is true that wheresoever motion arises force is expended, and as it ceases force is again ready for operating. The definition ensures the completeness (for their purpose) of the elements present to our thought. The mode in which these propositions come to be true, not only as mere matters of definition and verbal inference, but in respect to nature, is that, by a more or less long process of observation and reasoning, men have adapted their definitions to that which experience has demanded of them. The truths of geometry are true of the physical world because men have constructed their definitions according to the demands of that world. And what the geometrician now affirms is, not that there is space, or anything in space; but that certain things are true in respect to space—he having defined it to himself—and that in so far as things external are in space, *so far* the truths of geometry are true of them.

But it is worth while to note, in passing, that geometry bears upon its face marks of having undergone a great revolution. Is it not certain that, however men began the measuring of the earth, they did not begin by defining points and lines as things that have no substance or no breadth? that they began, in fact, by using measures of

tangible dimensions, and by a *reductio ad absurdum* were compelled to abolish them, and take measures which the intellect alone, and not the senses, could recognise. The process is visible in the result; the breadth of their measures falsified their results, and the definitions of the point and line are the fruits of their failure.

Let it be granted me for the present to term that kind of proof which means also truth, all the elements belonging to the case being present to the mind, "demonstration:" I shall then used the word *proved* to mean that a conclusion is the result of sound argument so far as we can see; and *demonstrated* when we have reason also to know that nothing pertaining to the case is left out, and that the conclusion is therefore a true one. Demonstration, as we have seen, may be secured by limiting the possible elements of any case by a definition; but it is not meant to be affirmed that it is not also attained in other ways. Whensoever there are consciously present to us all the elements which affect the case, be they gained how they may, proof is demonstration. And it is evident that however far this condition (and it is surely inexorable) may seem to throw back the possibility of certitude, it leaves the question of the truth or falsity of opposing opinions not in the least obscured, but rather gives decisive aid in the settlement of every controversy. Of two opinions which may be held respecting anything, that is the one binding upon the intellect which includes more elements than its opponent; that is, which takes into account facts which the other overlooks: in a word, that is the binding one which casts out a non-perception from the premiss. In one aspect, this distinction between proof and demonstration is but a mode in which the demand for the correcting of the premiss appeals to us. Till this is done, whatsoever evidence may come before us, howso-

ever inevitable a certain conclusion may be in presence of it, the proof means not truth, but simply the direction of least resistance to an imperfect thought.

But the relative truth given by the introduction into our starting-point of an element that had not been perceived is a result in no degree unsatisfactory. In relation to the question that had been before us, it is final, however much beyond it may leave unsettled. Thus, to take the question of one or many forces; the unity of force *as against its multiplicity* is demonstrated: what is not proved is that there is force at all; that is, that our conception of force is truly applicable to the external world. This awaits further study. But if we postulate the idea of force, and ask respecting it, "Is it one or manifold?" the answer is complete enough: it is so far absolute. Our idea of many forces rests solely on our non-perception of the constancy of force: it is one. Relatively to that question the elements present to our thoughts are complete.

The expression that thought takes the direction of least resistance—that is, of least opposing thought—may be subject to various remarks; as, for example, that thought exists where there is no resistance, has impulses of its own, has power to overcome resistance, and doubtless various others. But I do not dwell upon them, for this reason: that the parallel law in mechanics affords the answers. What is meant by the assertion of it in respect to thought is, that it has the same application in the mental world as the physical. It covers a certain ground in the latter, and has to be used with certain limitations: no other use is claimed for it in the world of mind.

CHAPTER III.

ON THE ANALOGY BETWEEN THE ORGANIC AND THE MENTAL LIFE.

In the working out of a *reductio ad absurdum*, the idea of a strain or tension, ending in a resolution, is plainly embodied. We have a false notion, with which, therefore, the facts cannot agree; but we with more or less labour reconcile them, supposing all the things necessary to make the false idea fit, until we find the result grows too absurd: the strain becomes too great. Suppose a thief in a house where all are believed honest and suspicion most unwelcome; every missing article sets on foot some hypothesis to account for its disappearance, until the mere multiplicity of these hypothesis makes them incredible; a weight of *supposition* is imposed on the mind which at last it cannot accept; the suppositions fall by their own weight, and the conviction, "There is a thief here," however unwelcome, is forced to take their place.

The tension and strain imposed upon the reason, which demands simplicity and rational connection in its beliefs, is the force by which the new conviction is brought; and the feeling, "I have been starting with a false assumption," is compelled. The process is strictly parallel to the putting more and more strain upon a barrier until at last it yields; or, as Shelley beautifully likens it—in respect to great new thoughts—to the accumulation of snow upon a mountain side until it falls in an avalanche.

Now, it is not only to processes accounted mechanical that this mental process is like. The relations of force in the living body obey the same law. The more or less

protracted "nutrition" and the sudden "function" are the most familiar of our experiences. We take *force* into our bodies in our food; we assimilate it in the processes included in digestion; it forms a *tension* on our muscles, and indeed on every organ; and on a ceasing of that tension every function is performed. Nature accumulates force for us which we employ; but we can avail ourselves of it only by thus incorporating into our own frames the tension; our muscles and nerves are as a drawn bow with the arrow ready at every moment to take flight. The living tissue contains force — force restrained; a weight, as it were, piled up and ready to fall, a pressure against a barrier, ready to produce its equivalent effect as soon as the barrier is removed. The organic and the mental process claim the very same terms for their expression. The process of making the false suppositions in the *reductio ad absurdum* is the nutrition; the correction of the premiss is the function. The *force* by which the conviction of the earth's motion is maintained in our minds is the force which was "stored up" in the old hypothesis of which it has taken the place. The false conclusion to which we are led by arguing or observing on a false premiss contains force; it answers to the living body full of power for action: the process whereby it comes is the mental "nutrition;" the ceasing of those false conclusions, on the perfecting of the premiss, is the mental function. In tracing this action of the human mind, we are tracing a process in the strictest sense vital or organic; it is a true physiology or process of life that is exhibited before us.

Further, since this process is carried out through many minds, and extends in its sweep through many generations, it presents visibly before us a life strictly parallel to the organic life, in which the individuals are as

atoms. We see in it the living process magnified; projected, as it were, before us on a gigantic scale. Here is a "nutrition" in which not particles of oxygen, carbon, hydrogen, with forces such as those of light and heat, are the factors, summing up their tiny activities within the scope of a few hours or months, or at most a short flow of years; but long generations of men, with all the potencies of human thought and will and inflowing agencies of nature through every sense. Here we see Life "written large" that we may read it; the long toil of thousands of men through thousands of years adding hour by hour new items of laborious search, or careful scrutiny, or scrupulous deduction, all collected into one great organisation, replete and pulsating with living force —*with living force of error*, be it noted—until the weighty fabric is complete, and falls—falls by its own weight; and through some lips, of no more potency than any others, and passive instruments of the force that carries him first, only because it is to carry all men on its torrent, a magic word is spoken, and knowledge arises new-created from the chaos. That is Life; the *reductio ad absurdum* is a nutrition ending in a function.

There must, in the mental life, be these two opposite processes; ignorance is banished only by their union, never by a single one. A deeper reason for this will perhaps appear hereafter; but in truth that it is a law common to the mental and bodily life is sufficiently significant. Nor is it much less so that our language appears already, although without full consciousness, to have recognised the fact. I have used the terms "nutrition" and "function" for the mental processes, adopting them from the bodily ones; but it is not necessary to have recourse to these; for there exists already a pair of terms exactly suited to denote these related processes in respect

to thought, although not yet distinctively applied to them: I mean the terms *Theory* and *Interpretation.*

It would be impossible to say that the ancients interpreted the heavens, and Copernicus made a theory of them: the words fix themselves in the opposite use; the ancients made (and, beyond all admiration, well) a theory of the heavens; Copernicus interpreted it. Now this cleaving of the words to one idea, and refusal to be applied to another, proves in them (however little it may be in our intention) a certain distinctness and definiteness of meaning. Nor is their relation in the least degree obscure. They fit themselves precisely each to one of the two processes of which a correction of the premiss consists. The word "theory"—it is its own choice, its own affinity, no arbitrary dictation of ours—fixes itself to the tracing out of results on the imperfect premiss; the word "interpretation," by an equal natural adhesion, lays hold of the turning these falsely true results[1] to their true use, in bringing to our knowledge the omitted fact or facts.

That is the exact description of every rightness that is based upon a wrongness; and there is no part of human life that has not been, or is not still, full of it. The word "theory" is very exactly adapted to this meaning; it is from the Greek *θεωρέω to see;* it means that which is the result of mere observing without the discovery of our own non-perception at the root; it may be called the "observation-true," such as the idea of *many* forces in Nature; which is true to mere observation. Thus we not only find ourselves already provided with

[1] No words could more exactly describe the characters of a "Theory" as thus defined than Tennyson's of Lancelot—

> "His honour rooted in dishonour stood,
> And faith unfaithful kept him falsely true."

terms answering to the twofold process in which the attainment of knowledge consists, but we perceive also indications of a power guiding man's words which is beyond his individual thoughts. These terms have meanings, real significations involved in them, which have never been intended; we perceive that they possess them, for they will not bend to an indiscriminate use, even though no man ever designed to separate them. For, as thus applied, it is evident that in the use of the word theory, there is conveyed the affirmation of a falsity; that is, of an incompleteness in the starting-point giving false results; but it is implied also that these results are not merely false, but definitely and adaptedly so; false in the right way, the way in which by being false they shall reveal the truth. Now in the word Theory as used in Science, there has been no intended meaning of falsity at all; the aim is constantly to acquire *the true theory* of any series of events. Yet, on the other hand, a meaning of untruth clings about the word and will not let itself be banished; to say of anything that it is "theoretical" is ever to count it of small value. May it not be that these characteristics of the word are really due to its fittest application being to that form of thought which is at once true and false; which presents a falsity that is the destined road to truth, being the fruit of the union of truth and error.

But it is not only in having thus contained within it, in the sequence of theory and interpretation, a parallel to the sequence of nutrition and function in the living body, that the mental life answers to the body. In the fact that thought takes the direction of least resistance (least opposing thought), it presents to us another parallel to the bodily life, not less close. It is inevitable indeed that it should do so; for this law of least resistance is

one which prevails, and must prevail wherever force is present.[1]

The structure of the body, its "organisation" as it is termed, exhibits motion determined by least resistance; each form and organ, and the harmony of all, are involved in this simple necessity; the form and resistance of the existing parts at every stage determining, according to that law (with the limitations always involved in it), the form and relations of all that succeed. In the bodily life, the law of least resistance beneath the influence of Nature's force issues in an "organisation," determining that the tension within it shall result in a function—suited to and serving the body from which it emanates. Even so in the mental life the law of least resistance, carried out amid the elements of perception and of thought that Nature furnishes, results not in a mere mass of knowledge, nor even in an array of it ordered according to some external order, marshalled as it were into crystalline forms however beautiful and shapely; it results in a living order, a structure, though it be built up of thoughts alone, an *organisation* though it be but of impressions of the sense and reactions of the reason in them, which determines that the tension within it shall result in *functions*, in actions suited to and serving the mental life from which they flow.

[1] It is indeed but one form of the axiom that the whole is greater than the part; being simply that a greater force operates more strongly than a less one. For the evidence of this law in the organic body, as well as of the relation of nutrition and function, see "Life in Nature," Chaps. I. and V.

CHAPTER IV.

ON SEEING THE UNSEEN.

RETURNING to the thought, that on an imperfect premiss a mere process of inference, or of observation, or even of both combined, conducts us not to knowledge, but to results which still embody ignorance, a practical question arises: By what process is the completion of the premiss effected? How may we know that the ignorance which vitiated the process at the first is no longer present? The answer is not at once obvious. For the problem to be solved arises not merely from the ignorance in which we start, but from the limitation also of our perception. Our course would be simple, if all we had to do were to use our observing faculties, and formulate according to our best reason the data presented to them; but it is not this. No formulating with whatever strictness or subtlety of reason of things perceived, or by any means whatever capable of being brought within perception will suffice; because the problem is how to fill up the gap in our perception, and supply *aright* elements which not only are unperceived at first, but to the last continue unperceivable. The gravity of the heavenly bodies is an instance. The gravitating motion, or tendency, not only is not presented to our first or casual observation, it remains equally hidden from the last and most refined; indeed, it is certain that so long as the stellar order remains undisturbed it never can be presented in relation to the bodies to which it is applied. Gravity, as a falling motion, or tendency to fall, cannot be "observed" in the regular movements either of star, planet, or satellite; the

bodies approach one another indeed, but they recede to an equal extent; falling is no more visible than recession; attraction no more obvious to the senses than repulsion. No amount of observation, nor of reasoning, upon things observed in their motions would have had any tendency to result in the present interpretation of them: in truth, both observation and reasoning had been tried, and well tried; had done probably all that was possible for them to do. The natural result of such exercise of man's faculties was that which they produced—suppositions of powers in the sun to produce rotatory motions around it; or similar hypotheses answering to that which observation presented to man's belief. Now, the nature of the error in all such suppositions is manifest; namely, that they were suppositions *correspondent* to the impressions that observation gave; and so embodying its imperfection. The explanation of the motions by gravity is an explanation by means of something that was seen not in them, but in something else; namely, in the fall of bodies to the earth. It introduces into our thoughts of those motions an element which, in them, is unperceivable. We may express this fact by saying, that the true explanation of the planetary motions was given by recognising in another thing something visible in them; the demand was for seeing an invisible, and this was the mode in which it was fulfilled.

Now, in this instance, there is presented to us an unusual law, rendered necessary by the fact of this limitation of our perceiving powers. Granted, the fact of this limitation, this law obviously follows; and we see in it the basis of a fact now recognised in Science, that a true scientific "induction" is by no means a mere inference from collected observations, but "a guess verified." That it must be so is evident; for only by this means can a complete basis of reality be given to our con-

clusions; the gaps in our perception being supplied not by our own suppositions but by realities presented by Nature. For in this way Nature herself gives the key to her own hidden things. And thus it is not difficult to understand the assurance of truth which is given by this kind of evidence. It is Nature furnishing us the key to her own proceedings. The thing which we suppose is no invention of our own, but is a reality, and one which we are bound to believe existing everywhere, unless it be proved absent. So in respect to Gravity—Newton's own claim for it was that in suggesting it he did not "invent hypotheses" but adduced a "true cause"[1]—a cause known to exist, visibly existing, in Nature. If we consider the evidence on which the explanation of the heavenly motions of gravity rests, we find that it has no other ground whatever than that all the appearances observed, agree with it, and that the cause assigned is one that is also seen on something else; that is presented to us also under a different form. And if the reader will test his convictions farther, he will find also (I believe) that he is unable even to imagine any other or farther proof as possible to be given of any account of natural phenomena, beyond this, that the cause assigned absolutely agrees with the phenomena, and that it is a thing which can be seen elsewhere in Nature.

[1] Hypotheses *non fingo.*

CHAPTER V.

THOUGHT AND ART.

How strange it is that logic has been set up as a complete rule or mode by which thinking is performed. For logic is the expression of that which all do after a certain fashion, which every one can do perfectly who has been trained in the use of logical forms. It is related to thought, as architectural drawing which every one can do who has learned to use a ruler and compasses is to paintings. This ruler-and-compass-work, observe, is not exactly *unrelated* to true painting; it is in every true picture (or in all true thinking) at once present and not present. It is there, but with so much more that it is only discoverable by taking away.

Thinking, indeed, is no mere mechanical process; it is a great Art, the chief of all the Arts; nay, it is both an Art and a work; it has the attractions of an Art and the positive results of a Science. Those only can be called thinkers who have a native gift, a special endowment for the work, and have been trained, besides, by assiduous culture. When others attempt to *think* it should be understood that the results of such attempts have the same kind of value that belongs to amature paintings. In the one case as in the other, what most cultivated men should seek and expect is the capacity—not to do the work—but to enjoy and appropriate the work of others. And indeed though we continually assume that every one is capable of thinking, do we not all feel that there is somehow a fallacy in this assumption. Do we not feel that what people set up as their "reasons" for

disbelieving or believing a particular doctrine are often nothing of the sort, but merely statements which would be at once discarded were it not for the opinions held.

These "reasons" are often to be found accompanying widely-spread beliefs; but although the arguments may be dismissed, it would be very foolish to suppose that it is of no importance what innumerable people have thought. The things that made them think as they did must have their full weight. In fact the more monstrous and repugnant in any way an opinion is, the more powerful must have been the forces which compelled men to adopt it. In the true opinion, then, forces must be present, but balanced.

If thinking be one of the Fine Arts, will not a comparison of its history with that of the so-called Arts throw light on both? May we not find a correspondence even in the details of their course? May we not even get guidance for the future—guidance in thinking, the hardest of the Arts from the study of the easier and therefore the earlier developed ones. Nay, the object of Art, we know, is to "interpret Nature." May not the Arts render this service best by acting as guides and servitors to the great interpreter of Nature, Thought? Bacon supposed, and our modern philosophy supposes also, that the only materials which can legitimately be made use of by thought are those supplied to it by the senses under the form of observation and experiment. The consequence has been a disunion and even strife between Thought and the Art feeling which should have been its servant. For all Art and all observation are members of one body built up into one head—which is Thought.

Our present Art and what we now call "Thought" (*i.e.*, Science and Metaphysics) are two halves. Each is imperfect alone. Art is so merely fanciful, and Thought

so dry, because of the negative in each, which, in our condition of ignorance, must needs be. The true Thought —non-existent yet—is to exclude the negative of each and make them one.[1]

The Art-faculty, the artist's own peculiar gift, is Imagination. Imagination is properly the power of seeing the unseen; the power also of putting ourselves out of the centre, of reducing ourselves therefore to our true proportions, of taking a view including ourselves, *i.e.*, of truly using our own impressions. And is not this, in reality, the chief element in the work of the thinker? Logic, apart from the exercise of the Imagination is, in fact, not Thought; it is, as it were, the skeleton of thought, the condition or mode under which the Imagination works in thinking, as, in other Arts it works under other conditions. Now, if this be so, how has it come to pass that logic is commonly considered to be *the* Thought-faculty.

Different forms of Religion have been, *in their progress*, opposed to all those emotions: that joy, that free spontaneous activity, in which perfected religion consists. And in the same way Thinking in the course of its progress, has assumed the form of a mere logic opposed to Imagination if only for this reason that the true Thought is Imagination perfected.

Art, including of course poetry, and Science (including logic) are to each other as the life of free emotion is to that of rigid restraint. They are to each other as the Gentile and Jewish lives, which are united in Christianity. The beauty in Art and the logic in Thought are the "Liberty" and "Law" respectively. Thinkers, as such,

[1] Art is one of two lines, Science with Metaphysics being the other. But Science and Metaphysics are themselves opposites within one line; are Painting (&c.,) and Music in the same way opposites also?

have for the most part suppressed their Art-instinct, their imagination. But all our instincts must have their foundation in truth. The perfect art of thinking must embody and express them all, and be true to the whole of man's nature with all its faculties.

The very law of progress is that no tendency is suppressed except for the sake of being perfected; ever the suppressed returns to be united with its suppressor. In what we call "Thought" the imagination has been suppressed for the sake of logic; in Art the truth has been suppressed for the sake of beauty; true thought will turn the negation out of each, and "break down the middle wall of partition" "making both one." Is not such union the very essence of Revelation.

Christianity appeared at first among the Jews, appeared as, and was called, a form of Judaism (though in truth Judaism had been but one negative presentation, one phenomenon of it, the Gentile life being another). It came from the Jews; but it had to turn to the Gentiles for its reception. When the true thought arises, will it not, though appearing as a form of Science, be received first by the æsthetic portion of mankind.

Poetry is seeing one thing in another, Nature in man and man in Nature, but how often is the vision confined to mere external things and accidents. Science assists in tracing force-relations and following processes. Each is opposed to the other only through the lack of its own perfectness. Each is in its own nature what the other only is supposed to be. Poetry an instrument of research, and Science a teacher of the soul by beauty, and interpreter of all things into spiritual meaning. Science *is* poetry; if it would use altruistic seeing: Poetry *is* Science, if it would use a true vision of the dynamic relations. Only by each laying aside what is its own does it oppose the other.

II.

ON THE BASES OF MORALS.

(*April* 1876.)

THE very interesting discussion in a recent number of this "Review"[1] on the "Scientific Bases of Morals" must have suggested many thoughts to every reader. To me it has recalled a view which may not be out of accord with some of the lines of argument there advanced. Perhaps for brevity and distinctness' sake a certain dogmatism of form may be excused.

Let me begin by recalling a few facts connected with the intellectual part of our nature. Man, being endowed with what I may term an intellectual consciousness, and existing in a world in which there are facts that have a natural relation to that consciousness, is, by that nature and that position, under a *law;* the law, namely, that his intellectual consciousness should correspond truly to those facts. These, merely, by their existing, have a claim upon the response of his consciousness, to them. If there be not that response there is non-accord of the external and internal; his consciousness is false, he is ignorant, and the consequence of the falsity—or non-response of the intellect to facts—is disaster, in so far as there arise any practical relations.

[1] See "Contemporary Review," September 1875.

By the mere existence of an intellectual Being among facts adapted to an intellectual response, there arises this claim, of which Science, in its largest sense, is the recognition and the progressive fulfilment. It is also to be observed that this claim for a true response to facts is the primary claim under which man, in respect to his intellectual consciousness, lies; all others are either directly fulfilled in this, or they are involved in it as means, or imply it as foundation. And this law of a true response is one that cannot be imagined absent, or, except by a perpetual and hurtful miracle, unavenged if broken.

But in fulfilling this law mankind have encountered two difficulties: one affecting the individual directly, the other affecting rather the race, and the individual chiefly through the race. For, in the first place, every man starts without this response of his intellectual consciousness to facts, and has to acquire it by slow degrees and more or less laborious processes. And secondly, men did not know that this was the law under which, as intellectual beings, they exist. Accordingly we find that, so far from having endeavoured to fulfil it, they set before themselves various other aims, or ideals of intellectual right, neglecting or even deliberately ignoring the claims of fact. Now of these two hindrances to a true response of the intellectual consciousness the second has been immensely the greater. The mere ignorance of the child is easily turned into an attitude of genuine inquiry, and when the mind is once open and alert, quick to perceive and patient to weigh, its true relation to the world is established. But the false aims at intellectual rightness kept back the world from knowledge for centuries, and have rendered even the recognition of the true demand an achievement but of later times.

Yet the fulfilment of it was an issue assured from the

first; the success of the process was guaranteed by the very nature of man's life. Disaster and failure have taught, or at least are teaching, him to know and to obey the law.

Let us pass now to the moral life. Besides an intellectual, mankind possess an emotional consciousness;[1] and they exist in a world where facts are present that have a natural relation to this consciousness; a claim upon it answering to that which facts have upon the intellect. Thus, that a man in my presence possesses teeth constitutes a claim upon my intellectual consciousness, to which if it does not respond I am ignorant. If he have a pain in one of these teeth, that is a fact which has a claim upon my emotional consciousness, to which if it does not respond I am emotionally ignorant. In each case alike I am untrue to nature; there is a discord between my consciousness and fact: in the one case an intellectual, in the other an emotional, *non-regard*. Now the claim upon the emotional consciousness for a true response to the facts which are related to it—all facts of good and evil whatsoever that come within its range—is as absolute, indeed is in all visible respects the same, as the corresponding claim upon the intellect. There is one "law" on both: the law of a true regard. And here also this law comes first; all other claims are either directly fulfilled in this, or are included in it as means, or imply it as foundation.

But to the fulfilment of this law also there have been two obstacles: one individual, one pertaining to the race. There is the non-regard to the claims on the emotions in which every child is born; and there has been, besides,

[1] These are not separable, of course, by any distinct line; nor could emotion be conceived as existing without intellectual apprehension; but it appears to me that they are at once distinct and blended just as sense and intellect are.

the ignorance of mankind that this true response, or conformity between the emotional consciousness and facts, is its law. As in the intellectual sphere, so here also, other thoughts of right have been erected and maintained; thoughts of right, or ideals, which have involved the ignoring or putting aside of the claims of facts.

Now in respect to the intellectual life this error has been corrected. However imperfectly fulfilled, the duty of a true response to facts as the first operation of thought and the only possible basis for its further activity, is affirmed by all; and almost every one admits that any intellectual processes, however logical, ingenious, or splendid, which are not erected on this foundation, are, so far as truth is concerned, wasted labour; useful, if useful at all, only as a discipline whereby a truer method may be gained. There is no "right" for the intellect, save on the basis of a true response to facts.

After much mistaken effort, and by aid of achievements of a bright but illusive splendour, cloud-buildings erected but to vanish, the intellect has recognised the conditions of its success. But the case is not the same with the emotions. In respect to them man tarries still at an earlier stage of the process. He is still trying to find a "right" for his feelings and his actions without having laid the basis of a true response to facts.

This radical error is visible in the thought that the character of right or wrong pertains, or can pertain, to "things" or external deeds. Mr. Sidgwick[1] says: "That there is, in any given circumstances, some one thing that ought to be done, and that this can be known, is a fundamental assumption." Yet reflection shows us not only that right and wrong are qualities incapable of pertaining to things, inasmuch as the same external deed will be, by

[1] "Methods of Ethics," p. 6.

universal consent, right or wrong, not only under different circumstances, but according to the feelings prompting it. Thus a father rightly chastises a son for a fault for the son's good; but the same blow given in selfish anger would be a crime. Indeed it is easy to imagine circumstances in which there would be no right deed whatever possible. A man is called out to resist an invading army; it is his duty to kill (or wound) as many of the enemy as possible. But suppose that in the hostile ranks he sees a person who is also his private foe, and the feeling arises in his mind that he is glad to kill him for his own revenge or gain, his act is not one whit less murder. To that man, so feeling, there is no right deed. If he kill he is a murderer, if he do not he is a traitor. The state of his feeling has banished all possibility of right—in things. Only one act for him is or can be right; so to turn his soul to his country's good and his duty thereto, that the private hate shall vanish, and killing again be holy. It is to the pure that "things" are pure.

Plainly, in such a case as this, the stress of right lies upon the emotions, and not upon the deeds. The fault was absence of the true regard; non-response of the feelings to the facts; unmoderated anger; lacking patriotism. But it is not only in exceptional cases that this relation holds. The very same perversion of right occurs wherever a similar falsity of the emotions is present. For where their perfect response to facts is absent, there the regard is to self; the deed, whatsoever it be, is done for self; and that only is "right" which can be rightly done for self. Now the things that can be rightly done for self are not the same that may rightly be done if the regard is on others. From the least things to the greatest this is visible, from taking life to absolving one's self from the commonest civilities. That which

is wrong if done for one's self may become right when the claims of "good" demand it. And the reason of the paramount importance of this response or non-response of the emotions to facts is obvious; it is a question of truth or falsity, of accord or discord between our consciousness and the world. It is impossible that such accord should really be dispensed with, impossible that any substitute should be found for it, or that any mode of action, in its absence, should yield satisfactory results. There is no substitute for truth—in absence of it no success.[1]

Now, the effect of the absence of the true regard is visible in history in more than one form. And here I cannot but think that Professor Clifford's profound and ingenious representation is at least inadequate. If the becoming of man's moral nature and practice had been as simple as is represented by him, how should it have presented some of the phenomena which appear always to have characterised it; those, namely, of a special sanctification as right of practices most mischievous to the tribe? Take human sacrifice; how can a regard to a "tribal self" have developed it in the forms in which it exists, undermining as it sometimes does the whole power

[1] The terms used to express the correspondence of the emotions with facts have, perhaps, an effect of hiding from us its real significance. The names benevolence, goodwill, compassion, indignation, love—fitting as they are—yet may turn away the thought from the fact that they mean, one and all, simply truth, and that the absence of them is falsity. Hence they may, perhaps, tend to mislead us into the idea that if these feelings are lacking, some substitute may be made to do instead—their absence in some way compensated for—which is impossible. In like manner the term "selfishness" is apt to mislead, as having a positive form, while it indicates a negative thing. Selfishness is absence or inadequacy of the response of the emotions to the facts which have claims upon them, and is that alone. A synonym for it, and one that it might have many advantages to use, is *non-regard*. Not only thought, but moral action also, is often perverted by the idea of selfishness as anything else than this, or as susceptible of any cure but by the cultivation of a true regard, a turning of the thought, to others *from the first*.

of the tribe'? The same may surely be said of the system of tabu, and of many other practices of less cultured nations, or how should it have developed asceticism in its most marked and frequent forms—in the extremes in which it is palpable waste of the general resources?

There have evidently been perverting forces, of which a superstitious regard to supposed supernatural Beings has been one. The lines of savage right seem often to be drawn more around fetish worship than round tribal good; and no fact in moral history seems more marked than this—that the enthronement of the good of men, as the law of right, has come so often in antagonism to existing rights, as reform or even as revolution. Has this fact been sufficiently accounted for? Why has right in man's thought so constantly tended to become a thing hurtful to, or at least not identical with, his fellows' wellbeing? Does not the fact that there is primarily in men an absence of a true emotional regard to facts, afford at least a partial explanation? For then, if there comes a desire of right or "being good," it necessarily expresses itself in restraints, in abstinences, or self-inflicted torments; in the sacrifice, above all, of the things or persons that are the means of pleasure. So we have given to us a key to the sacrifice of children—"the fruit of *my* body for the sin of *my* soul." The value of the child as an instrument of advantage to the parent lay at the root of its destruction. Naturally the most precious thing would be selected when the man asked, "How shall *I* be good?"

So that, instead of the moral sense showing signs of having been simply developed from an increasing regard to the social whole, there are signs that the order has been, in part at least, the opposite; that the feeling of

right or duty has preceded the larger care; has expressed itself accordingly in mere personal restraints and sacrifices, which have necessarily tended to be injurious rather than beneficial to the whole; have projected, as it were, as reasons, fictitious Beings whom the restraints or pains were supposed to please; and that the good of others or of the whole has taken the place of these arbitrary restraints in every case by means of a moral revolution, determined by the very fact of their mischievousness. In this order a certain dynamic relation is visible, a kind of life or organic process, not without likeness to that presented by the living body. For as, in this, force is first stored up in the various organs, and then used in their functions, or, as we see, the decay of one portion becomes the means of a higher development of the whole, so in the moral organism we see force stored up in the mere restraints which the desire of right brings in the absence of a true regard, and in the putting aside of these the truer feeling comes. Emphatically we see this process in the moral revolution initiated by Christ; but its outlines are plainly to be discerned in other great moral revolutions of the world. The true regard, or desire fixed on good, comes as the issue of a process in which the "moral sense" appears not as a resultant only but as a factor.

If we inquire, then, into the origin of the moral sense itself, more than one answer may be given. Professor Clifford's suggestion, that it arises from the gradual development of the feeling of a tribal self, might be accepted compatibly with what has gone before; but perverting forces must then be recognised as having played an immense part in its practical direction. Or it may be that as yet no account can be given of its origin, but that a desire for the feeling of being "good"

is parallel to the desire for any other pleasure; in the same sense a primary feeling, developing at a certain epoch, as is the desire for music or for art. Some of the facts of abnormal development seem to me to favour this hypothesis, there being apparently individuals in whom the moral sense is simply wanting, as in others the musical ear is wanting, or the eye for colour, or the sense of smell. There is, however, another suggestion for the possible origin of the moral sense to which I shall refer in the sequel.

Now, the view I have tried to suggest is, that the moral history of man presents to us a process; and that this process may be considered as the cure of non-regard, or the bringing of the emotional consciousness into a true response to facts; even as the intellectual history of man may be also described as the bringing of his intellectual consciousness to such a true response. When this point is attained, this demand recognised and kept steadily in view, then, in each case alike, a true foundation is laid; upon that basis any other aims may be erected or efforts carried out, but not without it. The attempt to found a moral life without a true response of the emotions is like an attempt to establish an intellectual system in ignorance of phenomena. The process suffers an inevitable perversion; the intellect is given over to chimæras, and wastes its strength in efforts to rise above sense; the moral nature follows in like manner false ideals, and wastes its strength in efforts to put away or limit pleasure; in a goodness about ourselves. Professor Clifford says, "There are no self-regarding virtues." But I venture to suggest that there must be self-regarding virtues if there is self-regard. Given that non-response to facts which constitutes self-regard, and "virtue" will engraft itself upon that fatal root. It has done so in the

the prolonged effort of the human intellect to frame a perfect ideal of rational conduct is seen to have been foredoomed to inevitable failure."

We consent to put "doing as if we loved" for loving. But it is not the same thing; and it will not answer the same purpose. It will not do to build man's life upon; it will not even answer as a basis for so light a superstructure as a theory of morals, which refuses to be constructed so. For it compels right to be sought in things in which it is not: the only right that can be in a "thing," is its expressing a true feeling.

But it will be felt that it is necessary to have the things that are right to do under every condition formulated as a guide to practical action, which else becomes a chaos of individual fancies. Let this be supposed for the present; it still does not affect what has been said. However necessary such formulating may be, it remains but a question of social discipline, and does not touch right and wrong; and if any clear insight is to be gained into these, must be kept wholly distinct from them. To let this ordering of things take the place of right in our thoughts is to turn them away from the true question of morals; and fatally reinforce, in the name of virtue, the already too strong tendency of man to disregard the question of his desires.

But whether it is so necessary that right should continue to be formulated as it has been, in definite things, may be open to question. Men have many times waked up to see that objects which they considered of the utmost necessity were needless; and that they had been held in bondage by mere panic-terrors, which seemed to them to have the most demonstrable basis in facts. The question depends upon how far an attempt to instil into every mind the law of a true regard, as the one and

absolute duty, would be attended with success. And what reason is there to suppose that if it were attempted it would not be fairly achieved? We see, in other times and other lands, what monstrous, distorted, painful rules, crushing all nature and doing the utmost violence to inclination, are taught, and successfully taught, in the name of right, and are carried into practice. Why then should it, in absence of experiment, be thought certain that a right so simple, natural, self-evident, so far from meaning violence to Nature or habitual pain, as the law of an absolutely true regard, should be impossible to teach and to gain such fulfilment of, from all, as should be on a par with the fulfilment now gained for the other laws which are taught instead? The absolute duty of a true regard is not taught; but instead are put the things which are right for the not-regardful to do.

But there are no such things. The most abhorrent doctrine of the deadest orthodoxy, truly seen, is the statement of a simple fact: "Whatsoever is not of faith is sin." With emotions not true to facts there is no right.

And having thus before us the clear thought of an object to be attained in human progress on the moral side, namely, the bringing of this true regard into the souls of all men; the structure of our complex nature is clothed with a visible meaning. The spiritual and the sensuous part are not engaged merely in a strife; the best issue of which is the mere victory of the higher over the lower. They are joint factors in a common work; to which each contributes an essential element. For the absence of a true regard makes the sensuous evil, when with the desire truly fixed on good it is not evil. And thus the wrong state of the soul expresses itself inevitably in a strife to put away the sensuous; and the very failure of this effort constitutes the means by which, in

the larger life of the race, the false desires are made true. It is even as the false attitude of the intellect of old expressed itself in our effort to put away the sensible; and Science is fulfilling the conditions of perfectly admitting it. Without the sensuous, refusing to be put away, the thought of men might have rested, perchance for ever, on themselves, and nothing have made them conscious that a thought so resting was *untruth*.

The question has been raised—"Who is the most developed man?" It becomes important, when development is taken as the guide, to have a test for that which is the true development. I venture to suggest that the most developed man is he who has the least reason for not simply obeying his impulses, or, that perfect impulses mark the perfect man. For obeying impulses demands conditions. He may be the child of the wind who has been born of water. The simple function of eating seems to exhibit a complete moral process which has already so far reached its achievement that it may be taken as a type. With his thought fixed upon his pleasure a man strives in vain for a law on eating; there is no "right thing" for him to do. If he indulges his appetite he runs into excess; if he restrains himself by rules, and eats by weight and measure, he sets at naught Nature's subtle promptings, and still breaks the laws of health. There is no right for a glutton, nor has Nature any law for him, but one—to cease to be a glutton. And when this law is fulfilled, and the man's thought is no more upon his pleasure, but the taking of food has become to him a means and not an end, there is still no other law; no right things; his right is obedience to his impulses, for which he has fulfilled the conditions. Now in this is not the image of all life presented to us? Human good is too wide and unknown a thing by far for any wisdom

of ours to predict its means, or rules of ours to insure. But if the thought of men were taken off their pleasure, and the response of their emotions made true to facts, would not this mean that their impulses would become true guides to action?

And from this point of view another suggestion may be made as to the source, or meaning, of the moral sense. For let it be supposed that the perfect condition of any Being involved that his impulses were perfect guides to his action, then we can trace how an imperfection in him might express itself in a "moral sense," or intuitions of right or duty. For an impulse is an "intuition of desire;" and a desire perfectly following good would mean that every perception of good constituted in itself an impulse, the good being desired. But if the desire for good were absent, this same relation which constituted the impulse or intuition of desire, would remain as an "intuition" still but without the desire. That which would, in the perfect state, or with true desires, be an impulse by absence of true desires would sink down into an intuition of *ought*, that is, of duty, or of right. So the moral sense, with its intuitions of things that "ought to be," seems possibly explicable as an imperfect form of impulse; as derived from it by absence of desire of good; a negative condition; looking towards one more complete; vouching for the latency, as it were, of impulses ready, when the condition is fulfilled, to spread over, and rule, and guide with Nature's own truthfulness, the whole compass of man's life. The doctrine of intuitions of right and wrong would thus appear as an unconscious affirmation that man's perfect nature is to be guided completely by true impulses. Of these intuitions of "ought" are the germs; their empty forms, unfilled by desire, and frozen therefore into rules, and rules that have not, and till they be filled and

made fluent with passion cannot have, a true controlling power.

To have the thought off pleasure and on good is to have impulse free; and happy therefore is it for human life that, on every hand, at every hour, in every deed, questions of good and evil are at stake, and challenge our regard, so that our thought need never centre on the question of our pleasure.

The true basis of morals then is to be sought by shifting the thought of right away from things to the attitude or feeling of the soul. It consists in the absolute demand embodied in man's structure and relations for a true response of the emotions to facts. On this foundation any superstructure must be built; any that is built without it must be perverted and destined to fall. There is no right on a basis of non-regard.

Two corollaries follow from this position; first, that the basis of morals is not itself a question of morals, but of truth; and secondly, that it has no necessary relation to "others,"[1] but comes to be thus related in our case through the particular conditions of our life, whereby the good and evil of others constitute the facts amid which we, as emotional beings, live.

[1] Any more than "knowledge" has any necessary relation to "matter and force."

III.

OTHERS' NEEDS.

(*Unpublished*, 1874.)

AMONG the passions, or desires, of men there exist, more or less widely, a desire for pleasure and a desire for goodness; that is, men have a desire to enjoy, and a desire to do what they feel it right to do. These two desires vary both in their forms and in their strength: the desire for pleasure may be more widely spread and constant: but the desire for doing right has proved itself certainly not less powerful in very many of those in whom it has existed.

Now it is a fact that these two passions have been, at certain times, in intense opposition. The desire for right, or for goodness, as it was understood, led men (as it leads some still) to oppose to the utmost degree their desire for pleasure. We call those times the Ascetic ages. Among us, this tendency has, for the most part, passed away, and the desire for goodness, however strong, seeks for itself other satisfactions than that of a mere putting aside of pleasure. Yet there still is a feeling among us that goodness, or doing right, has *some* opposition to pleasure. Our recognised thought of goodness is, more or less, that of foregoing our own direct enjoyment; and that (in this world), however much of greater

joy may come with it, it must have the character of being a giving up of pleasure.

But if we consider, it will be evident that whether goodness has any connection with foregoing pleasure or not depends on the state of feeling of the person. Suppose a person wholly regarding some other's good, and having no desire except to serve him; then it can make no difference to his goodness whether the action, on his part, which that other's good calls for, is pleasurable or not. Such a person's "goodness" consists in his desire to serve the other, in the absolute preference of that other's advantage to his own; and this cannot be in any way affected by the kind of action for which that other's good may call. That would make moral quality depend on merely external circumstances. Take the case of an architect who, gratuitously and for the children's sake, draws a plan for a school; let it be supposed that it is an artistic pleasure to him to draw the design, and a tedious task to calculate the materials required. Suppose a morning spent by him in the calculations and the afternoon in drawing the design. It were absurd to suggest that he was more "good" in the tedious than in the pleasant task: both are done for the children, both equally done for them; both absolutely alike in goodness.[1]

When the regard is to others, a man's goodness has no relation to any abstaining from pleasure. In truth, so far from this, a goodness which consists in a wish to serve others must prompt a desire, rather, that the actions

[1] It might perhaps be more strengthening to the character to do a toilsome task, but that is a different thing. And it is also true that the nature of the motive may be more *exhibited*, and visibly shown to be free from regard to self in the action that involves pain. And this may be of great advantage also for many reasons, but it is a different thing from more goodness being *present*.

by which that service can be rendered should be pleasurable ones. For the desire will be for the most efficient service, that is, for the most perfect performance of the serviceable deed. And deeds are most perfectly performed when they are pleasurable; for not only does the same amount of effort produce more result in actions that are pleasurable than in those that are toilsome or painful; but in the very best work pleasure is an essential constituent: without joy in the doing no work can have the most perfect excellence. A perfect desire, therefore, to serve another, with no thought of oneself, would lead to the desire that the act of service should be a pleasurable one, in order that it might be of the very best kind and performed in the most effective way. Undoubtedly, a perfect desire to serve implies a perfect willingness for painful service if it be required: if there be not that willingness the desire to serve is not perfect: but it cannot induce the least preference for absence of pleasure, but rather the contrary; for the presence of pleasure in it gives most power to the service.

Whence then can come the feeling that goodness has a connection—however vague or slight—with abstinence from pleasure? The source of this feeling is plain. For if our thought in any case be of ourselves, or in sō far as it is of ourselves, a desire for goodness can express itself only in a willingness for, or acceptance of, diminished pleasure. This follows from the very fact of the regard being to ourselves, for though it may be by no means wrong to do a pleasant thing for our own pleasure's sake, it cannot have any character of positive goodness; and nothing is left for a desire for goodness to express itself in, except self-restraint and the putting away of pleasure. All other methods are cut off.

Thus by regard to ourselves these two desires within

us—for pleasure and for goodness—are put into opposition. We may, in a sense, gratify either, but both together we cannot. Regard to ourselves, however innocent, or legitimate, however free from excess, or carefully guarded against injury to others, carries with it this effect inseparably: it makes our passions fight. If we will enjoy pleasure we forego goodness; if we will seek goodness we forego pleasure. A natural, harmonious expression of goodness is cut off, and the desire for it is forced into an antagonism to pleasure not in the least degree belonging to it.

Is regarding ourselves, then—even in any way, however moderate, refined, subdued or delicate—*natural?* How can it be natural if it has this unnatural effect on goodness?

But is it not necessary? Clearly not. Suppose a man acting wholly with regard to others, what would he do? First, everything that it would benefit others for him to do, or injure others for him to leave undone. Secondly, whenever it occurred that his action could benefit or injure no one, then—since his strength is used for others—he would do that which tended most to maintain and increase it: and that would be to enjoy all pleasures that did not injure him; weaken his body or enervate his will: that is, he would enjoy all pleasure that is not excess; and excess means less pleasure in the end. A person acting wholly for others would do all things there was any use in doing; and when no *use* was immediately concerned would do all that most increased his power. There is no reason, therefore, for any one to act for himself: there is this reason against it, that in so far as he does so, goodness to him is perverted, and made to mean a thing it does not mean; nay, more, a thing it cannot *safely* mean.

But in so far as we do pleasant things, do we not necessarily act for ourselves? Also, clearly not. This is a palpable confusion of things that have no necessary connection. A father said to his son a short time ago: "You see you must take care of yourself and eat your dinner, or what trouble you would give to us." That is, it is not necessary, in the least, to eat our food for our own sake; we can do it for our friends'. "Taking care of ourselves" is not a thing that need be done *for* ourselves. A general in command of an army sees combats going on all around him which he must wish to share more closely; but he takes care of himself, avoiding risks of wounds or death, for his army's sake.

Again, suppose a person goes to see a sick friend, along a pleasant road on a fine day, and the walk sends pleasure through every vein; he goes for the sake of his sick friend as absolutely as if his path lay through morass and storm. If it had lain so, he would have gone just the same. The pleasure is an incident, not a motive. Whatever pleasant thing we do, however pleasant, however keenly enjoyed, if we would equally have done it for another's sake though it had been unpleasant, we do for that other's sake, not for our own. There is no more unreasonable confusion than that which confounds doing things which are useful to others, if they are pleasant, with acting for ourselves.

Yet this confusion has evidently misled men into terrible errors. It is visibly at the root of the cruelties of the ascetic life. That life was an attempt to put away acting for self; and in this it must be held to have had a true and noble aim. But with a confusion in men's minds between doing pleasant things (though useful to others) and acting for self, it is evident that the attempt to put away acting for self must have meant, to

them, putting away all pleasant things: while in truth it means not this at all, but doing all things, pleasant or painful alike, that others' needs require.

Another error, not less fruitful of evil and especially affecting us, visibly has had its source in the same confusion. This error is the opinion that men *must* act mainly for themselves; that that is their nature and the construction of the world, and the spring by which its progress must be carried on. We have seen that this opinion has no basis, and that no single action of all man's life need be done for himself; but with a confusion existing in his thoughts between doing pleasant things and acting for self, it is evident that that opinion must have been forced upon him, as soon as the ascetic attempt to put pleasure away for the sake of goodness had to be given up, on account of the evils which it caused. If doing pleasant things (though useful to others) be confused with acting for self, then to find that pleasant things cannot be put away, must involve the conviction that acting for self is necessary.

This, therefore, is the relation of *our* life to that of the ascetics: to a great extent the same confusion exists now as then, between doing pleasant things and acting for self; but the difference is this: that while the ascetics, thinking thus, sought to put away all pleasure, we, having to consent to pleasure, have consented to acting for self. But the effects of acting for self are not changed by this: the war it introduces between the desire for pleasure and the desire for goodness remains unhealed. It is still as true as it was of old, that acting for self *makes* goodness to consist in putting pleasant things away, and leaves it no other meaning. The strife has changed its issue in our hands, but it has not ceased. Our fathers, making goodness and pleasure fight, sought

to give the victory to goodness, and pleasure lay crushed before it:—before a false name of goodness; we, still making goodness and pleasure fight, even as they, consent to let pleasure conquer; and goodness lies crushed before it:—before a false name of pleasure. For that pleasure to which good is sacrificed is but a false pleasure.

Of old, a false name of goodness; goodness outside, but lacking its soul: now, a false name of pleasure; pleasure outside, but lacking its soul. For the conditions of goodness and of pleasure are the same: the strife between them must be reconciled. In their very nature they are one; and neither truly possesses its own Life till they are made one. They are one when the regard is to others; opposed when the regard is to self. What then are others' needs to us? They are the appointed reconcilers of goodness and pleasure.

Beginning with regard to himself first, man *makes* his goodness mean refusing to enjoy; and three courses are open to him: to refuse goodness and indulge his passion for enjoying to the utmost, crucifying one unsatisfied passion in his breast; or to refuse pleasure, and indulge his passion for goodness to the utmost, crucifying another unsatisfied passion in his breast; or lastly, to try and make a balance between them, indulging neither fully, but half-heartedly, crucifying within his breast both passions; tantalised, but no more satisfied than before. Keeping regard to himself, either of these courses he can pursue; each of them he has pursued, as history bears visible testimony: the last is ours. No other course is open. Regard to self means war between pleasure and goodness: strife between man's passions. They are seed and harvest; sowing self-regard means reaping war.

Then, had there been no wants of others to appeal to them, men must have remained thus for ever: torn by

opposing desires, beaten about between alternate ice and fire; between self-pleasure and self-torture, flying to each but to think the other better; and with no deliverance. Pleasure for himself and no goodness; or goodness for himself and no pleasure; every part of life in which the one was, made barren of the other: how should he rest? How does he? When we feel our lives unsatisfying, our hearts ill at ease, need we look farther for the cause? With whatever limitations, with whatever superadded charities, if our own wants are put first, disharmony has entered into our souls; there is strife within and no outside resource can ease it. The needs of others bear the remedy; for by them the strife is healed. Others' needs put first, made the motive of life, determining its rule, bring back the banished goodness over the whole domain of pleasure. For this is what the needs of others do. Quite falsely we look on them as demands, as interfering with our enjoyments. They never have been so, nor are so. The enemy of pleasure is the demand for goodness arising in man's heart while his regard is still on himself. While his own pleasure or his own virtue stands first in his thought, he makes his desire for goodness the banisher of pleasure, and leaves it no other choice; turns against all joy a power against which nothing can permanently stand; which has proved itself stronger than fire or sword, mightier to endure than all tortures are to tame. The power by which joy is banished is that which makes man's own passion for goodness banish it, which forbids him to let pleasure be because it will mean pleasing himself. The reconciler of goodness with enjoyment is—the needs of others.

In two ways the needs of others make goodness and pleasure one. First, by removing the contradiction between them which acting for itself introduces. They

make free all pleasure; for every pleasure that is service to another, taken for that other's sake, has in it all the goodness there would be if it were pain. And when a service to another is in itself a painful thing, and the fulfilling of other's needs means the foregoing of our own delight, even then those needs do not change their character, they are still the bringers of joy. For it is not they that impose the pain; man's own need for goodness would have imposed that upon him. What the needs of others do is to bring into this pain, or sacrifice, —hard task and burden as it is when for our own goodness' sake we take it,—a leaven of delight; they make it no longer virtue for our own sake, but service for another's: itself a joy; *the* joy.

With false eyes we have looked on others' needs; man's nature was at strife within itself, and they have come with soft hands and supplicating voices, and offered to it peace. They offer it to *us.* Only by ignoring and disregarding them has the strife been made. For what would regarding others' needs, and being wholly led by them, imply? Absence of enjoying? Starvation, sackcloth, foul air, indolence, banished beauty, neglected art, forgotten literature, impeded thought? Of all these things the utmost contrary. What most *serves?* All *pleasant things;* among them, yet only one among them, that most essential element of joy, energetic and industrious work. Whatever injures *any one* detracts from service.

The thought of goodness in diminished pleasure betrays its origin: it arose from putting self first; which perverts the thought of goodness into that of self-restraint:—into goodness *about* self and for its sake. Yet there has been a value even in that error. It was well that man should have thought that goodness must be in suffering, should have consented to accept it so: should have sought sorrow,

and said to pain: "You are my friend, my chosen portion." Not until he had done so could his eyes have been truly opened, his heart made free for pleasure that is not for self. And therefore, perhaps, it is that God has used men's own ignorance and folly to give them a reason for the thought that service also had in its nature some connection with pain. It is plain, if we look at life, that it is not so; that men's most continual services to each other are in things that are pleasure; and that if service were alone sought by all, life would be full of pleasure beyond all thought of ours. If it were not for the disorder man's self-regard introduces, in disease almost alone would service not be pleasure. Yet it is true that the greatest services have been rendered in pain: the services of the martyrs, of the refused teachers of the race. But this has been so, not by any connection in their own nature between such services and sorrow. On the contrary, by their own natural tendency they were joined with the utmost delight: with the joy of true vision, of clearer knowledge, of discovery of truth unknown before; a joy than which a keener is scarcely known to man. Only by man's folly have these services been joined with sorrow: because ignorance feared light, and thought it did God service in killing those to whose eyes it was first given. God has used man's folly and his sin to join together service and sorrow; so that men have said: "It is pain to serve, but let that pain be our delight."

But not in itself does service mean sorrow: not in themselves are others' needs the ministers of self-restraint. They *forbid* goodness to banish pleasant things: they put away self-restraint, by putting aside the self that needs it. Over the whole domain of pleasant things, on which self-regard broods with a sullen blight—making it bare

of goodness if pleasure come, or bare of pleasure if goodness put her foot—over the whole domain of pleasant things the needs of others sweep like a breath of spring; and the barren pleasure, all for self, the barren goodness, all for self, alike break forth and blossom into a pleasure that is good.

Everything in man's life—every pleasure, every duty—that has not had regard for others' needs put first in it, will betray that falsity within by this mark; that it will show a false restraint—a false virtue—a thought of goodness that is good not because it serves, but because it is less pleasure. By that sign it may be known that others' needs have been not regarded there: self has been put first, and brought forth its fruit: a goodness that means less pleasure.

And thus also we may see a power that God has kept in His hands, to put away from the heart of man that regard first to self that clings so close to him. For whenever the regard to self has made men—for their goodness' sake—refuse pleasures, then, by bringing needs of others which demand for their fulfilment that those pleasures be *not* refused, God makes a call upon man's soul, a new and deeper call. In those needs He says to men: "Be different in your hearts; cast out from them that which puts pleasure at strife with goodness; make the thought of others first."

IV.

PROFESSOR TYNDALL ON THE RELIGIOUS EMOTIONS.

(*December* 1874.)

"To find a legitimate satisfaction for the religious Emotions is the problem of problems of our day." These are the words of a man who stands as one of the best exponents of scientific knowledge, and as a fair representative of the feelings of scientific men. They are distinctly free from any trace of antagonism to Theology, considered in itself; and in so far as they express dissent from any existing theological views, imply it in the most modest form; simply affirming that the solutions reached hitherto, upon a line of inquiry that has his intensest sympathy, seem to him not to satisfy all the conditions of the problem.[1]

By a "legitimate" satisfaction it is evident is meant a satisfaction that, while contenting the religious aspirations, does not come into conflict with the operations of the intellect as expressed in the results of Science; a claim which no one now would wish to controvert. The

[1] It might be remarked here that, inasmuch as some of those conditions—our knowledge of physical phenomena, namely—were not present when these solutions were formulated, it is not surprising that the forms given to them failed adequately to recognise these conditions; from which, however, it by no means follows that the solutions themselves are not fundamentally correct.

feeling expressed, then, being so absolutely innocent and so worthy of a man, it is perhaps worth while to cease for a moment from controversial assaults upon the speaker (even though they might be in other respects deserved), and to see whether or not anything may be accomplished in the direction in which his face is turned, and on a method which would command his sympathy.

It is possible that at least one step may be taken. Let us look at the task that is suggested for us. We are bidden to seek some thought respecting the Universe and our relation to it that shall do two things: in the first place, shall satisfy the religious Emotions, and, in the second, shall not contradict the results of the exploration of the Universe by our senses and our intellect.

Let us put these two conditions into definite terms; and take the second first: our thought must not contradict Science. Now of all the results of Science none is more universal or emphatic than this: that there is no arbitrariness in the series of events which constitute our experience; but that a perfect order prevails through them all, an order which our intellect can apprehend under the form of cause and effect, or, better, of constant persistency of amount both of matter and of force; or, perhaps better still, under the form of a perfect "connection in reason" between all events. Against this result of Science our solution must not offend: it must not ascribe arbitrariness to that which it may recognise as the agent, or existence, or power, operative in the Universe. And on the other hand, the solution must, in like manner, not offend against the demands of the Emotions (which evidently have demands as clear and as incapable of being merely set aside as those of the Intellect itself). Now one demand of the Emotions, absolute and most emphatic, is that this agent, or existence, or power, is not to be

regarded as mechanical. If it be so regarded—as a mere mechanical necessity—then the intensest and deepest interests of our life are subject to mere blind forces; the very Life of moral Beings, their moral life as well as physical, liable to be marred or ruined by that which is nothing more than the mere impulse of a falling stone. This does not satisfy the Emotions, but stifles them.

We have thus, at once, apart from theory, two characters that must (on Professor Tyndall's principles) be embodied in our thought of the Universe: one that the power or existence exhibited in it is not arbitrary; the other that it is not mechanical. There is a boundary on either hand, one erected by the Intellect, and one by the Emotions, marking out the path that we must walk in.

Is there any difficulty in fulfilling these two conditions? What is that which is at once not arbitrary and not mechanical? What at once free and necessary; unbound and yet perfect in order?

The real simplicity of the problem becomes more evident as we advance. There has been a tendency to regard the demands of the Intellect and of the Emotions as opposed or mutually limiting each other; but in reality they are mutually confirmatory; and only seem opposed so long as each is but partially apprehended. The emotions as much demand the exclusion of arbitrariness as Science does: disorder and unreason—absence of necessity—are, truly, at least as repugnant to them as to the intellect: the moral aspirations as utterly refuse arbitrariness as does the severest Science. And on the other hand, Science to the full as absolutely refuses mechanicalness in Nature as do the religious aspirations.

For it is long now since Science discarded the idea that it could include within its formulas the true power by which the order of natural events is determined.

While retaining the names of *matter* and *force*, it is express in affirming that these names are not used as the names of absolute existences, or as denoting the presence of special qualities in that which is the true subject of our research; but that they are simply used as terms for something the true properties of which are unknown, but which (as it is presented to us) is best investigated by aid of the ideas which these terms convey. This view has even frequently led to the expression that matter and force are merely used as x and y are used by the mathematician; as symbols for the study of things in themselves unknown. Matter and force so far answer to our sensations and our conceptions that our thoughts can best trace the relations of things by laying hold of them under these terms; but they do not represent to us the things themselves.

But if this be so, then Science does not affirm, but expressly repudiates, mechanicalness in Nature. For to affirm that, would be to affirm that the ideas of matter and force do truly represent existence. To Science the world is no more mechanical than it is coloured or warm; as colour is an idea derived from a mode of our Sensation, so also, fully as much, is force, or mechanical necessity. The one is derived from the passive sense of sight; the other from the active sense of touch: but, for reasons easy to see, the latter sense [of touch] presents characters better adapted for the general expression of the phenomena than any other.

In this respect, then, there is no antagonism between the demands of Emotion and of Intellect: alike each repudiates mechanicalness, repudiates arbitrariness: affirming, therefore, both unitedly, a necessity not mechanical.

But further, that a contradiction should exist between the religious Emotions and Science in its present attitude

is impossible. For the conceptions furnished by Science are universally agreed to be but phenomenal; that is, Science presents to us but an appearance. Now, to estimate aright our real position here, we may turn to the appearances presented by the sense of sight in relation to their objects as known by touch. It is evident that the appearance to the eye of an object, under circumstances of light, distance, position, &c., may differ in an extreme degree from that object. Our experience, indeed, would lead us to believe that there may exist scarcely any traceable resemblance between them. In tracing the relation of an appearance to the reality, therefore, there is no reason, in experience, for our expecting to find likeness between the two: the only result that we can expect to gain is, that we should be able to trace a reasonable connection between them; that is, that we should discover how the object should, in accordance with reason, present such an appearance to us.

Granted, therefore, that the "phenomenon" or appearance of the Universe, as presented to us, is best apprehended as matter and force, and its characters best expressed in material terms, there is no presumption that the fact resembles this phenomenon. There is one result, however, which experience justifies us in hoping to gain: namely, to become able to trace, rationally, how the truly existing Universe should present to us the appearance that it does. That is, to learn why an existence that is not a material world should impress us as if it were one.

Even now does this task appear impossible? Surely not absolutely so. For even in Professor Tyndall's own words, a parallel is suggested to us which may furnish guidance to our thoughts.

We can interpret mere appearances to the eyes into solid things because we can bring into use the sense of

touch;[1] and, on a larger scale, when we have most completely gathered together all the perceptions we can gain by sense, we can interpret the appearance that is so presented to us, by bringing into use the intellect.[2] Thus we rise from appearances to the truer facts by bringing in the aid of other powers: we add touch to sight, we add to the aggregate of the senses intellect. Now there is (as Professor Tyndall points out) yet another element of our being besides reason; namely, the Emotions. So, to interpret into a truer fact the appearances presented to intellect—that is, the "phenomenon" which Science attains—what should we do but bring in the aid of the Emotions? The very same process which enables us to pass beyond appearances is open to us again. We have not availed ourselves yet of all our means; we are midway in a course which calls us to continuance, and in which the experience of the past gives us assurance of success. The "problem of problems of our day," then, is this: So to use the Senses, the Intellect, and the Emotions *together*, as to learn from the appearance which is presented to us in Science,[3] some truer fact, in respect to which we shall be able to understand why it should present to us this appearance.

Now the turning-point of the question, and that also which makes it difficult, is this introduction of the Emotions as part of the means whereby we are to gain a knowledge of Nature. But preparation has been made for it in the steps we have already taken. When we exclude from the fact which gives us our experience—that is, when we exclude from that which we call Nature

[1] So we find that there is no merely *superficial* thing, although we can never *see* more than surface.

[2] Thus, the multitude of apparent "forces" which the senses present to us, are interpreted, by aid of the intellect, into one unceasing "force."

[3] This is sometimes termed "the phenomenal."

—on the one hand arbitrariness, and on the other hand mechanicalness, and so recognise in it at once necessity and freedom, we perceive that we have placed before ourselves a problem which we need the aid of our Emotional powers to solve. The terms are without meaning to the intellect, but they are not so to the moral feelings. To them nothing is more familiar than an action at once free and necessary. It is as solidity, inapprehensible in the strict sense to the eye, is familiar to the touch. In either case we transfer, as it were, a problem from one of our powers to another, to receive its answer. Here the moral Emotions give plain reply: an action at once free and necessary is an act that we know as one of love, or rightness. The Existence, therefore, that presents to us the phenomena of Nature is one in which such powers inhere as enable necessity to be present, and yet not mean passiveness: such powers as can let action in its fullest sense exist, and yet not put aside necessity. They are the powers, therefore, which we apprehend by our moral Emotions; which, in an imperfect way, express themselves in these.

Let this then be, for the argument's sake, supposed. Now can we or can we not rationally discover how an existence with characters thus of a moral or spiritual order, should present to us the appearance of an Universe of matter and force? The mere unlikeness need present no difficulty; but many questions arise which cannot be included here. Yet one suggestion may be made. One characteristic of the "material" may be questioned as it were, in this light, respecting its real significance. "Cause and effect" is an universal condition of the phenomenal. Now cause and effect is a name we give to the ceasing of one thing coincidently with the occurrence of another; it has been described sometimes, even in the language of

scientific men, as "one thing *merging itself* in another;" as if it were—even when looked at from without and in mere appearance—the visible image of the giving up of one life for another's being. Now if the order of Nature truly were mechanical this would of course be a merely inaccurate expression, as implying spontaneous action where there can be none. But if material Nature be but the appearance of an existence not mechanical, but acting in ways to be truly grasped only with the aid of the Emotions, then the expression is more than justified. So far, at least, the appearance may be rationally referred to the fact; for what appearance could more truly represent an act of everlasting "merging self into another," than this perpetual flux of cause and effect which Science presents to us?

Thus one character of the material world gives us aid in recognising the material as the appearance of a spiritual existence. Through being bound in a seeming chain of cause and effect, Nature challenges us (as soon as we recognise that her processes are not truly mechanical) to acknowledge in her a life that appeals to the heart. Mere passiveness being put aside, a different energy, which we best know as a passion of the soul, takes its place: for Science forbids us to suppose caprice or accident. This constant order—when a passive or mechanical necessity is refused as its explanation—comes to us with a new significance. Leave out the *action* from self-sacrifice, and does not "cause and effect" remain?

And it is to be observed that this character of the phenomenal (or material) world which is thus found to be spiritual in its meaning, is the one which most of all has seemed the contrary. So long as men took their own sensuous impressions to guide them, and assumed that all they had to do was to carry their own sensation of *force*

everywhere, as if it contained the key to all things, then this unvarying cause and effect was the fact which above all banished spirituality from Nature; but when we have risen above this bondage, and gained liberty for our other faculties also to take their part in determining our thought, then this absolute rule of reason amid all change, this constant giving up of being to find it in new forms, this meeting of every fresh demand with ready sacrifice, have a voice not heard before. That which seemed darkness has become light.

And if this fact that most seemed hostile to the Emotions thus becomes their guide, it is reasonable to expect that other characters of the phenomenal world also would be found to have a similar significance. When the idea of a dead mechanicalness is fairly banished from our study of Nature, and the thought is kept fairly before the mind that the material Universe is but the appearance to us of some existence not yet recognised, a freer pathway is opened for thought. There is a road yet to be trodden with a guidance no less sure than that on which Science has hitherto relied.

But into further illustrations we cannot enter now; in the meantime, it would appear that the claim put forth in the name of Science for a satisfaction to the religious Emotions which shall not conflict with its teaching, gives to those Emotions not a limitation, but an enlargement of their field. It affirms for them a right to share in the interpretation of Nature itself; and puts aside the very possibility of conflict by uniting them with Science in a common work.

And the mode in which this result is effected is full of interest. For in truth the efforts made to maintain the claims of the Emotions have been the very causes of their loss, and the seeming defeat of their cause is its real

victory. For it is through the recognition of the law of cause and effect as universal that it is made to be recognised as the appearance of a spiritual act. If it were not universal, then it might have been left still mechanical in our thoughts, and the religious Emotions might have been cheated indefinitely with a partial and precarious satisfaction, such as they still endeavour to find in claiming a sphere of exceptions to the law, or a Will *beyond* it. But through at once insisting on the universality of the law of cause and effect, and at the same time on a satisfaction (not conflicting with this) for the religious Emotions, they are given this better and fuller satisfaction still: that the law itself becomes the domain of these Emotions, and is to be interpreted by them.

They chiefly therefore owe thanks to Science, who thus through it receive the fulfilment of their own desires, made better than they desired.

Perhaps it may be found that, in lines somewhat such as these, a positive investigation, not fated to barrenness, may be carried on. The points I have tried to suggest are chiefly two. One, that this problem is rationally presented to us by the present state of Science; namely, to try if we can learn how a world not having the properties we call material should present the appearance of a material world to us. And the other, that in this inquiry the emotional part of our nature has a legitimate place.

V.

ON FREEWILL

(*October* 1, 1875.)

THE present condition of the controversy on Freewill appears to be one of peculiar interest, inasmuch as it seems to have issued in a distinct recognition of failure, at least on the part of several of the more impartial and reflective minds. It is enough to refer to the expressions of the late Professor Cairnes in reviewing H. Spencer's "Sociology," and to the similar position taken by Professor Sidgwick in his "Methods of Ethics." Both of these weighty authors, summing up the arguments for and against Freewill, find them on each hand too strong to be set aside, and a conclusion, therefore, impossible to be drawn. And it is interesting also to note that different grounds are assigned by the two writers for withholding their decision. Professor Cairnes is deterred from yielding to the evidence of a mere necessary sequence in human volitions by its hostile bearing upon moral effort; Professor Sidgwick by its opposition to the direct evidence of consciousness. That is, the study of the phenomena seems to lead to one conclusion; our own nature seems to claim a contrary one: or, may we not say, the objective and subjective aspects of the question are at variance.

Now, if we look away from the particular problem at

issue, and turn our attention to this condition, regarded abstractly, of antagonism between objective evidence and subjective demands, it hardly seems difficult to understand its meaning. It may seem strange that it should exist in respect to such a problem, but the position itself is a simple one. Such an antagonism arises, necessarily, whenever a premiss needs correcting. Given a false or partial starting-point, and let true mental processes be carried out upon it, and there comes inevitably this exact result—the subjective opposed to the objective: the evidence of the phenomena conflicting with the claims of the consciousness. Draw any two unequal lines and assume that they are equal: consciousness or reason will claim one result; the phenomena will persist in giving a different one. Or, ignore the persistency of force and take note only of its visible manifestations; the phenomena give us a multiplicity of isolated entities, the mind demands simplicity and unity. A falsity of the fundamental thought—a lack, that is, in the premiss—issues, of course, in this result. If we consider the matter in this wider aspect, there ceases, perhaps, to be much that is surprising, certainly anything that should be disappointing, in the fact that the demands of our consciousness and the evidence of observation should be at strife in respect to Freewill. On a question that penetrates so deeply is it really any wonder that our fundamental assumptions should need enlarging? Or can it disappoint us that the issue even of so long a study should be the clear demonstration of this fact? Assuredly it cannot be called a failure. The discovery of a flaw in our premiss, wherever we attain it, is success.

Have we not succeeded, then, in respect to the problem of our freedom, in gaining conclusive evidence of need for a truer premiss? If we have, we have gained strong

presumption that the problem is soluble. For it is ever by a more adequate grasping of premisses that the domain of real knowledge is extended.

In all recent discussions of the question that I remember to have read, Freewill has been treated as the possession of a power; as a positive element, or true ability. Has it been discussed, in modern thought, as the question of a negation or absence of power? Yet it would appear that this view is a possible one: in our experience absences are sometimes felt as positive things; negations are found even practically operative. I propose to try this thought as a "premiss" in considering the question of Freewill.

It is not wholly an inappropriate one; certain of our established thoughts suggest it. For in Freewill is included the idea of an arbitrariness, of at least the possibility of unreason, of non-necessity. But the human race have formulated for themselves another idea of action than this: a mode they have counted more perfect. Allow that the idea may be inaccurate or unreal, still mankind have had it before their minds: an action, namely, that is necessary; which excludes arbitrariness, and to which choice were an indignity. It is the Action they have ascribed to God; that necessary truth to which it is impossible to lie. Here is a freedom on which mankind have fixed their thoughts, which is perfect not by absence but by presence of necessity. And from this, by a lack, would come that kind of action to which necessity is wanting.

There are one or two illustrations which may serve to make the idea clear. Lord Bacon, in his Essay on Truth, says:—"There be that delight in giddinesse, and count it a bondage to fix a beleefe; affecting freewill in thinking as well as in acting." Now, it is possible to imagine

beings not only affecting, but really possessed of, a "free-will in thinking." It is only necessary to suppose them wanting in the faculty of logical apprehension, unperceptive of that necessity of reason wherein the true freedom of thought consists. Such a "power" would be the expression of an absence.

Yet it might conceivably be "possessed." It is doubtful, indeed, whether it has not been the real condition of men in certain states. But if we imagine such "freewill in thinking" to be the characteristic of a whole race of beings, so that, while themselves possessing only this marred faculty, they should have present to them no other beings more truly endowed, with whom they might compare themselves, but only things wholly insentient, we perceive that to them the very idea of thinking would be that of Freewill in Thinking. This wanting faculty would necessarily stand to them as the faculty itself; its very defect would rise up into their feeling as a power; the arbitrariness would tend to become a glory; the lack of necessity a boast.

And with this justification, or at least excuse, that to their experience arbitrariness and thought would have ever been associated, and necessity have been found only where thought was not. Yet it would scarcely be unnatural that beings so endowed and yet so wanting, possessing that which by its very nature claimed completion, should have imagined, as a greater and more perfect power than their own, a thought to which necessity was not wanting: thinking which was free because not arbitrary. Would they, indeed, have erred in so conceiving?

A power of Freewill in Thinking—idiotcy to the logical relations; non-response to reason—what would it bring? Disaster, failure, evil. And to those who had it, experi-

ence would teach one lesson: that, though the "power" of thinking as they choose might be possessed, yet that the only wisdom was to act as though it were not.

In what respect do the two "Freewills" differ, but that we, smiling at the one, are afflicted with the other? That order which we cannot choose but follow, that gives true freedom to our thought, is it not wanting to our action?

There is another illustration also which carries the same suggestion under another point of view. The difficulty of the question is this, that when we study Freewill, and try to prove or test its existence, it disappears; we not only cannot grasp it, we can bring evidence, apparently clear proof indeed, that it is not; and yet, on the other hand, our consciousness will persist in affirming that it is: we can prove it is not anything, and yet we cannot but perceive it. Nay, the more we *prove* it is not, through our attention being directed more closely to it, the more we *perceive* it is.[1]

But the contradiction has a familiar parallel. Suppose a person, not knowing that a shadow was an absence of light, set to work to study it. He would prove there was nothing, would demonstrate it did not exist—nay, could not; but he would perceive it all the same. The more he proved it was not, the more unequivocal his perception of it would become.

Always this must be the result of studying an absence under the idea that it is a presence. We prove it is not, but our perception of it remains. And conversely, when there is and persists a perception of a thing, and it is proved by examination that it is not, is not demonstration given that it is an absence? Might not this contradiction in respect to Freewill, if we had better

[1] See Professor Sidgwick very emphatically on this point.

observed and been more ready to apply our known experience, have suggested to us, long ago, that it was an absence we were studying?

Let us suppose that this at once unbanishable and untenable phenomenon of Freewill is an absence: an absence in our experience of that necessity which is the true character of Action (as it also is of Thought): what is the position which we thus affirm? Not that there is or can be arbitrary action—that order can be absent—but that our experience is phenomenal; that we have a feeling of that as being which cannot truly be; of doing that which is not truly done. It is simply proof from another side that that which *answers* to our consciousness is not the same as that which truly *causes* it. The absence in us of that which would express itself in necessity of action is but another side, or aspect, of the shortcoming of our consciousness, on which the metaphysicians and even men of science now delight to dwell. This fact, which speculation so enforces, presents to us also a moral side in the phenomena of volition; and thus at once a greater force of meaning is given to the speculative proposition, and a harmony is introduced between the various aspects of our nature. As our phenomenal knowledge does not fill the idea of knowledge, so our phenomenal action does not fill the idea of action.[1]

Thus a clearer conception of the nature of our life seems to grow upon us. For we seem, even involuntarily, always to draw a distinction between Man and

[1] So far from the "phenomenist" seeking to repudiate Freewill, thus apprehended, it should be a natural part of his logical position; it brings up, so to speak, his whole line to one front. And at the same time it puts aside an antagonism. What could be more likely, indeed, than that we all are antagonistic to our fellows partly, at least, through being inconsistent with ourselves?

Nature: even when any such distinction is denied in theory, the words betray that it is felt. But from the point of view here taken the meaning of this distinction may be considered afresh. For if the absence of necessity from Man's action is a lack, then the presence of necessity in Nature assumes a new aspect. It may truly be, there, that which a true necessity in Man would be: the necessity of a perfect will. Nor does it affect the question that it is felt by us as a mere expression of force: the force is but a mode of apprehension of our own. Man may differ from Nature, not by possessing that which Nature has not, but by lacking that which Nature has.

My limits will not permit me to do more than make these mere suggestions, of which I will add but one more: namely, that this mode of regarding the question of Freewill is one that is much more widely applicable. It consists simply in not assuming any phenomenon presented to us as necessarily either existent or non-existent; but in seeking to ascertain whether some fact that includes more elements may not be recognised as presenting to our apprehension a phenomenon that is less. In other words, whether that which is present to our consciousness may not be *derived by a minus* (as *e.g.*, colour is from white light) from some larger fact to which our thoughts must turn, if our experience is to be rightly interpreted, or even harmony introduced into human thought.

VI.

THE RELATION BETWEEN THE ORGANIC AND INORGANIC WORLDS.

(1872.)

In the chapter on the correction of the premiss it has been rather assumed than argued that the marked differences we perceive between the organic and inorganic worlds arise not from unlikeness in the things themselves, but from the different mode in which they are presented to us. It was with this view that the history of man's thought in respect to *motion* was adduced.

Motion is one thing in nature; but when the Greek thought of it, he divided it into two kinds, and contrasted them sharply; when we think of it, we think of it as one, though to us, as much as to him, there are only unending motions in the heavens, only ending motions on the earth. Now the interest of this change of thought lies in this: that we see in it, first, the tacit, unsuspecting assumption of an absolute difference between two parts of nature, as if it were obvious beyond question; and secondly, the awakening of the mind to perceive that the difference was but apparent, and arose from a difference in the mode in which these parts of nature are presented to the sense. We see man's dawning consciousness of the necessity under which he lies, in order rightly to

understand the world, to be aware of the shortcomings of his perception, and to include within his thought that which seems at first to contradict his sense.

The proposition that Life is not a distinction of the organic world, but is a common property of the whole of nature, and only made visible to us in the organic, implies, of course, that relations are really existent in the inorganic that do not directly affect our senses; so that we receive at first a deceptive impression. It gives us the same challenge which the affirmation that motion never ceases gives; the challenge, in a word, which is the very touchstone of science—to feel in one way and think in another.

But the history of man's thought respecting motion—first assuming it as two, and then learning that it is one—has further suggestions for us. It is true that in learning that motion does not cease, even on this earth, where practically every motion so surely ends, the supposed distinct and *inferior* earthly motions are seen to differ only in mode from the heavenly motions, that had been exalted above them. But this is not the whole: we have learnt something also respecting the heavenly motions which mere observation of them never could have taught us: for motion is not presented to us as we most truly think of it, in the heavens any more than on the earth. Below, we see it under conditions which make it seem not to continue; above, we see it under conditions which make it seem not to continue in the same straight line. We hold two properties true of motion: that it continues, and that it proceeds always in the same line. Now we nowhere see motion presenting to us *both* these characters. Every straight motion ceases; every continuous motion is a curve. We always perceive it under conditions which hide from us one or other of these two characters,

which yet we unhesitatingly affirm always to belong to it. We always see it either under resistance which makes it practically cease, or under gravity which makes it practically curved. What man has done is to unite in his thought of motion at once the not-ending which he perceives in the heavens, and the not-bending which he discovers upon earth; from the two presentations of motion to him (which once he took for granted meant two kinds of motion), he has raised up MOTION—the one everlasting, rectilinear motion that he knows, and which nature everywhere acknowledges for her own.

I would suggest that the very same lesson is put before us again by the diverse-seeming organic and inorganic world. There is some unity, some truth of nature—when we know it we shall be sure to call it Life—which is presented to us under these two forms; neither truly the one Life as it is, but both together giving us the key to it. In the inorganic we miss some characters that it possesses; in the organic we fail of others. But also each possesses some that the other lacks. The subject cannot be treated yet; it floats before us but as the misty outline of a distant shore. Yet even now we may see so much as this: that in the inorganic we seem to discover uniformity, unchangeableness, necessity; in the organic we seem to perceive spontaneity, action, power. Yet in each, as it so appears, something is wanting; the unchangeable necessity seems to reveal no action; the spontaneous action seems as if changelessness and necessity were absent from it. Each presents to us that which we already begin to know cannot be the truth. Nay, already we have begun, even if unconsciously, to interpret each by the other, especially to discover that in organic things there is no lack of necessity or want of perfect order of causation. So that already there glimmers before

our eyes a vision [is it not the vision of the Life that truly is?]—of an action in which also is necessity; of a necessity that does not banish action. It is true we directly perceive it nowhere. Neither do we, nor *can* we, anywhere perceive that to which alone we truly give the name of motion; but nowhere also do we perceive anything that does not demonstrate and reveal its presence.

But to come to matters of demonstration: if it is proved that the force in organic things, and through the presence of which we call them living, is a force coming from the inorganic world, and returning into it, is there any longer any meaning in affirming that 'Life' is confined to the organic? If it be meant that this force exists in a peculiar mode in the organic, different from any other mode, of course, it is true; but it is as true of electricity in a wire, or magnetism in an iron bar. The organic force appears to have some special relation to the properties we term chemical, and may—in some respects truly, though doubtless very inadequately—be imagined as being a *resistance* to certain chemical tendencies, which establishes a state of proneness to chemical change. This is like, not unlike, the inorganic. Or if it be said that the distinction of the organic is not in its force but in its forms, in the complexity and adaptations of its structures, so manifold in use; then two things must be remembered: (1) that the name of Life is *not* limited to such adaptations and formations of special structures, but is given quite apart from them—the white of egg is living; and (2) the source of these adaptations of structure that strike us so in the organic world, is exactly the question. Why is not the natural inference true that they spring from, and express, an equal or superior adaptation, and beauty of structure and order, in the whole universe around, but which we, by

the narrow range of our perception, cannot see until it is made visible to us in these smaller wholes? Does our not perceiving a thing prove that it is not present? If our puny lives and capacities did constitute elements in a great living whole, should we be at once perceptive of it? It must be remembered that the burden of the proof lies not on him who says the organic and inorganic worlds are one though differently related to us, but on him who says that they are different.

But it is not necessary to urge reasoning. The evidence that the structure and adaptations of the organic world are determined by demonstrable conditions around them, and so express relations that have their source in the larger nature, is daily growing more complete. That the forms, with all their delicacy, are imparted from without, is as evident as that the force that works within them is imparted from without.[1] If, then, both the force and the forms are given by the world around, what remains to justify the denial of the unity? It *is* the same fact we see in each.

That there is a natural revulsion from this view I admit. Who among us has not felt it? We hate to reduce all the beauty of life to fortuitous concurrences, and even more, probably, to a mechanical Fate. Nay, I own, the thought is to me ridiculous. I do not understand how one who is assured that no "matter" and no "force" ever come to be except through just so much matter and force having been before, can imagine that order and adaptation can come to be save by order and adaptation having been before. If not-order can make order, why not not-force make force? Is order but an idea?

[1] I abstain from details on this point, having discussed it before. See "Life in Nature: On Living Forms." But reference may be made to Mr. Herbert Spencer's writings on Biology.

matter and force are the same; alike, both are names for our sensations. Is order a mere condition or mode? force also is but a name for condition. Why is the primary law of the mind, that will not let anything be supposed to begin absolutely *de novo* and of itself here to be set aside? In no thought can those instincts of our nature which demand some adequate cause for the beauty and wonderfulness of organic life be so fully satisfied as in the thought that accounts it a resultant of the force around; for this means that all of wonder and of beauty that we can discover in the less is proved also of the greater; only more still is proved; such beauty and such adaptation as should make this little world we call organic—this tiny offshoot—the natural and inevitable expression of its glory.

We let ourselves be befooled by size. Taking *any* view of the organic life, we must conceive the body as made up of molecules; small particles of carbon and oxygen, &c. Now, I think, no one supposes these minutest molecules themselves to be more living in the organic body than elsewhere. The "life"—it is the material or physical life we are speaking of—lies in the relation between them. Now, would a creature endowed with reason, and yet small enough to live on one of these molecules and find them of an enormous size, perceive that they were parts of a living whole? They would be to it mere dead masses; how would it know that the forces that moved them were the forces of a great Life? But why should not the molecules of a living body be as large as suns and planets seem to us? and why should not the dwellers on them have called one of the powers of the Life that rules them—gravity?

But it may be asked, what reason is there for insisting on the identity of the organic and inorganic? or what

use in wresting the term Life thus to a new meaning? There are differences, practically of the greatest amount, between the two: why should not Life still denote to us those differences? The reasons to my mind are both obvious and important. First, there is the question of truth. To think of the one world as living and the other as not living—twist or obscure the idea of Life as we may—is to think falsely of them; whatever difference it is meant to imply, it is one that has no right to be affirmed, and that therefore distorts our thoughts of each. And secondly, it hinders our knowledge; for two different presentations of one object give us more than doubled powers for rightly understanding it. If the organic and inorganic worlds be truly one, we can by the one interpret the other; in the very fact of their apparent difference they throw on each other a mutual light, each making visible to us characters which in the other are hidden. This advantage is plain in the two apparently contrasted forms of motion; but in the intricate problems alike of physics and of physiology of how much greater service to us were such help! And perhaps it would be a help to us chiefly in the direction in which we are prone least to feel our need of it; namely, in the interpretation of the inorganic world. For it is at least possible that our feeling here is inverse to the truth, and that, instead of understanding best (as we seem to ourselves to do) the inorganic, we understand it least, and therefore feel it to be so much more simple. It is possible that the assurance we feel of knowledge here is the assurance that is the very mark of ignorance; and that nothing so much could prove that we know most—little as that most may be—respecting the organic world, as that we have at least discovered that it is a "mysterious" thing. Suppose we came to feel that the

mechanical explanations which had seemed to answer so well for all that was not "living," were really no more than the mechanical explanations of organic processes by aid of which our predecessors contrived to make themselves content with a false feeling of knowledge? For what have we done, in these explanations of the inorganic, but take one feeling of our own—the feeling of exertion and resistance—and apply it to all outside things as if it contained the sum and substance of their secret? Formulating the facts around us in terms of one of our own sensations—is that real knowledge of *them*? Indeed it is no longer called so.

But all the while there stands beside us the organic world, pregnant with a fresh significance, introducing new meanings, suggesting quite other reasons, revealing a whole series of relations and of ends, of which we had no glimpse before. Yet when we turn to study it, it refuses to be found different. On one pedestal after another of special divineness or nobleness we seek to exalt it; but it descends from every one in turn, and claims kindred with its lowlier brethren. What does it mean? Is it not simply this: that the organic world is but the part of nature that we best and most truly know —the part nearest to us, most within our ken? The inorganic is afar off from us; we can perceive it but through senses which leave upon it each its own impress; but this throbbing body of our own—we feel it, our very actions are *its* actions; we know that it is living. If we find, by every test we can apply, that it is one with the other larger world, it teaches us that that larger world is living too. It is not that in the seeming more there is something added, but in the seeming less there is something unperceived.

So, as we have sought, and with so much success, to

explore the living body by the aid of the inorganic processes, there awaits us a yet richer study; the converse: by aid of the organic processes and results to explore the inorganic world. How many hidden, utterly unlikely, things we have discovered by this method in organic life! Why should not hidden and utterly unlikely things reveal themselves, by use of the same method, in the opposite direction? And what could be of more certain use than if we should prove that *vital* relations—processes, and ends akin to those of our own lives—rule all around us? It were unworthy here to give the reins to fancy; but there is one simple point on which already it is right to dwell. In organic life the processes are *cyclical;* we never see one action without its complement, its opposite. In this respect we see nature there most truly; and in so far as this character seems absent from the inorganic, there our perception is in fault. The thought of any process as unconformed to this law, and as complete without *that* completeness—of showing us a cycle—is one which demands to be banished from our minds. In this, all processes are as the vital processes, and by the aid of these we may better learn to see them.

But the chief good to us of learning that the organic and inorganic worlds are one would be that it would deliver us from the conception of ourselves as exalted above the rest of the universe, endowed with higher prerogatives, and bound therefore by special and higher laws. We wrong *ourselves* when we deem that the laws nature obeys are mere mechanical necessities, and therefore unsuitable for us; they claim from us a study more reverent, more open-eyed. Who took as the type of the true man the wind?—the wind that blows where it *likes;* and of which no man need ask whence or whither; he may be sure that it is going where it is needed to

keep nature's balance true. Were not the wind's law, law enough for us?

Our thought of nature influences all other thoughts; nor can we, while that continues false, read aright our own destiny, or even our own duty.

VII.

SIR W. HAMILTON'S PHILOSOPHY.

(*October* 1859.)

It is a pleasant thing to feel that a task is done, especially if it be one of difficulty and embarrassment. To have achieved a final result, and have earned a title to repose, are among our dearest pleasures. Exertion, with a constantly receding prospect of success, is of all things one of the most irksome. Naturally, therefore, we trace the effects of this disposition in the history of philosophy; for it is here that men's energies have been exerted with least visible result, and their patience most cruelly taxed. If, therefore, we are sometimes disposed to blame with harshness the fantastic theories which have been set up as solutions of the problem of existence, pity for human weakness may claim a mitigation of the censure. Surely it is too hard a self-denial to demand even of a philosopher, that he should admit the labours of his life to have been fruitless, and allow that no positive result has rewarded exertions which have consumed all his energy.

This feeling has doubtless been at the root of the satisfaction with which hypotheses, that the first touch of common sense dissolved, have been put forward as the end of all controversy, and the final reconcilement of reason and religion. We should reverence these proofs

that men, whose lives have been passed among abstractions till they might seem to have outgrown the common affections of their race, have after all been like ourselves. Let us welcome, not with rebukes, but with joy, this touch of nature which makes the man of soaring intellect kin to the weakest of his fellows. Here are the proofs of affections, not dormant, though concealed; of passions ruling still, though seeming to be subdued. This is the love of iron souls, the water springing from the rock. It is the mother's feeling which blinds the philosopher to that which all else can see. His theory is the nursling of his heart; he has nourished it with his blood, and pressed it to his bosom. No treason to the soul, no falseness to the reason, can convince him that it will not be a faithful subject, and do good service to the state. No stern and loyal father is he to plead for justice on his son—"If thou hadst groaned for him as I have done" is the secret answer of his heart to all accusers, which distils itself through his brain in paradoxes and dilemmas, syllogisms and definitions, divisions of the indivisible and confusions of that which ought never to be confounded, till we could hardly suspect what it is that comes to us in such a questionable shape.

But it is not only in the positive theories which have been put forth in such variety, as the end of all inquiry, that this feeling is to be traced. It has another and more subtle form by which its influence is extended over a different class of minds. If a positive final result cannot be attained, cannot we attain a negative one? So the native desire for finality is equally gratified; and if something has to be given up, compensations may be found; if we abandon one pursuit we have more leisure for others; if some hoped-for results are forbidden, others may be more successfully attained. Granted that philo-

sophical certainty is beyond our reach, yet science opens inexhaustible avenues to our research, and presents at once demonstrable certainties and tangible fruits. Thus, in a new and insidious form, the tendency to affirm a final result of our labours asserts itself. It has two poles, a positive and a negative. The one is, "I have found out the ultimate secret; there is nothing further to be done." The other, "I have found out the limit of our powers; no one can go further." the natural desire to have earned repose is in each case fulfilled. The former was the temptation of men in bygone times; the latter may be ours.

Would it be too bold a question if one were to ask, whether the limit of our powers might not be a very difficult thing to discover; hardly less difficult, perhaps, than the essence of things? Does it not imply, indeed, that we have discovered at least *one* essence, namely, our own? Could we otherwise know the *limits* of our powers? And if, then, we have discovered one essence, might we not hope to discover more? Our own nature has sometimes been represented as one of the most difficult subjects of research; is this a mistake, or can we know the limits of the powers of a thing, while we know very little else about it? Thoughts of this kind will intrude into the mind. And with them will come others: is it really humility that attempts to fix these limits, or is it not presumption rather? Is it distrust of self or self-confidence? May we not be going as much beyond our legitimate sphere when we undertake this task, as when we undertake to give a solution of the origin of evil, or the nature of being, or any other problem which we are forbidden to attempt?

And besides all this, we cannot help reflecting that the limits of the human powers would have been differently

fixed in each different age; nay, that of old the profoundest intellects did make this very attempt and failed utterly; pronouncing it beyond man's power to penetrate the laws of the material world. How then can we know that this is the age in which those limits can be fixed aright?

And finally, why will it not suffice to say that our power of answering questions has at present a certain limit, without speaking for the future? Once, men could not discover the relations of natural phenomena; they felt them beyond the limits of their powers. But when they changed their method they found their powers larger than they thought. Might not a change of method, possibly, by extending our powers, teach us that we had fixed their limits prematurely?

In attempting *now* to answer certain questions, we are brought to contradictions. True. Therefore we shall never answer those questions? Is not the conclusion too large for the premises? Were it not better said—We shall never answer them unless we can alter our way of trying? Cannot that way be altered? Let us see. Thus speaks Sir W. Hamilton on "consciousness:"—

"We proceed to consider the authority, the certainty of this instrument. Now it is at once evident that philosophy, as it affirms its own possibility, must affirm the veracity of consciousness; for as philosophy is only a scientific development of the facts which consciousness reveals, it follows that philosophy, in denying or doubting the testimony of consciousness, would deny or doubt its own existence. . . . If philosophy is possible, the evidence of consciousness is authentic." (Lectures on Metaphysics, vol. i. p. 265).

That is, in brief, there must truly *be* a table, because I feel it as I do. The authority of the sensational conscious-

ness is the postulate and starting-point of this philosophy. It reposes upon the faith, that our consciousness of the existence of physical things does not deceive us. Else were "the root of our being a lie."

In this starting-point it does not pretend to be demonstrative; but it gives a reason why we should forego demonstration. And this reason is, that otherwise we cannot have a philosophy. But, not to refer to the fact that some men prefer to be without a philosophy to accepting it on these terms, let us consider whether the dilemma itself be a fact. Is it true there can be no philosophy unless the deliverances of the sensational consciousness be true, or be held as true? Is there not a perfect basis for philosophy if these deliverances be false, *provided it be known in what respects they are false?* Might we not have philosophical certainty if we had to *correct* our consciousness? Falsity or error in our consciousness interposes no obstacle whatever to philosophy, if such error have its laws so that it can be allowed for. It is clear that a philosophy, founded on the basis of a definite and known falsity of consciousness, would stand on a foundation at least as broad and firm as on that of its authority and truth.

It would have a foundation, indeed, broader and firmer. It would make less demand on faith; it would be more consistent with itself; it would be safer against objections. Nay, it might even be such as to compel assent from all men. If the error in our consciousness could be demonstrated as necessary; if the correction of it reconciled contradictions, and proved itself conformable to facts; if the theory stood the test of experiment; must it not command the assent of all? For what is science, in which all agree, but a great scheme for the correction of consciousness? The assertion of the authority of conscious-

ness leads to contradictions when we think, necessitates our fixing a limit to the capacity of man in all future time, makes philosophy contemptible in many eyes. Are not these sufficient reasons for calling it in question?

If consciousness, then, should be corrected, by what means is this to be done? Sir W. Hamilton has himself furnished the answer to this question by pointing out that all the mental operations are forms of consciousness. One form of consciousness is to be corrected by another. The sensational consciousness is to be corrected by the rational. Sense is to be subordinated to reason. The sensational consciousness authoritatively testifies to what we feel; the rational consciousness should authoritatively determine what we think. Suppose I *feel* a table to exist, and *think* it does not exist, is there any harm done, any violence to reason, any shock to faith? Do I not feel things to exist in dreams; and when I wake do I not think that they did not exist? Do I not use the rational consciousness to correct the sensational? Is not this the rule on which I always act in every affair of life? And when I find that the sensational consciousness has deceived me, do I sit down and complain of illusion, or give up hope of knowing? So far from it, I find nothing more natural. Only by such correction can there be harmony between sense and reason. It is the nature of the sensational consciousness to deceive and to demand correction. For if the sensational consciousness have not authority, still it has some cause; and this cause it is the part of the rational consciousness to discover. The problem of philosophy is but this: by the exercise of the rational consciousness to discover the cause of the sensational consciousness; and its means is, not to assume an *authority* anywhere, but to investigate. *To my thought*, there must be something which

causes my consciousness: how ought I to think of it, and how can its operation to produce my consciousness be traced and understood? If, in this investigation, we may at last come to a limit of our powers, may we not feel well assured we have not reached it yet? What a scope expands around us; what a vista opens before us! How should we know beforehand by what means God has thought fit to cause our consciousness? How should we learn, except by diligent thought and examination directed to this special question? Have we not a well-nigh boundless field to explore before we can say we have earned a right to answer it? For this we must examine well ourselves that we may learn how our own conditions affect our feelings; we must diligently examine the whole phenomena, leaving no part of them unexplored; we must exert our reasoning faculties to the utmost, that we may not suffer contradictions or inconsistencies to pass; we must control our natural impatience, and suspend our judgment resolutely to the last, that we may not assert the dictates of our own ignorance, and dignify with the name of faith what is rather a faithless shrinking from the duty of doubt.

For is it not a marvel that a philosophical theology which seeks to establish as its grand result that man must not suppose he can know what God is, or judge what He may do, has for its foundation this principle:—That God *must not* suffer our consciousness to be erroneous; that He cannot have done so! Is it possible such a superstructure can have been raised on such a basis?

Gratifying as the occupation is, we must forego for the present the satisfaction of assigning limits to the powers of man. This lofty function is not yet ours; it must be the reward of longer labour, of more rational and persevering toil. Our part is humbler. Our work is, not

to crown the edifice, but to toil in hope and patience at the foundation. Nor need we be discontented with our lot. That longing for a finished work, a result that shall prove to be an *end*, is an illusion of the mind. Nature knows no such ends: all her ends are means. Let us be content that ours should be so too. That is the truly permanent and complete which is subservient to a larger scheme, and dies into a higher life. The victory which philosophers may win is not that of rounding human thought into a perfect and increscent whole; the crown which they may wear is not a garland for their individual brow. Their task is nobler, their reward more blest. To them it is given to be nothing in themselves; to struggle amid darkness and error towards a light, firmly believed in, though but dimly seen; to gather up the growing elements of thought at each epoch of man's life, and mould them into forms which shall enable their successors to be wiser than themselves. This is their labour, their reward. Toil unrequited is their glory; failure their success.

VIII.

THE IDEA OF CREATION.

(*May* 1860.)

It is time that we should see what God reveals to us in Science, and that is the law to which He submits Himself. Apart from Science, indeed, Nature reveals God. The heavens declare His glory. That which may be known of Him is clearly seen by the things which are made. Under both dispensations, inspiration has invoked Nature's testimony to her Maker. The simple shepherd on the hills of Palestine, and the cultivated Greek, responded to the appeal. Since then, in every age, the same argument has been repeated, and has elicited the same response. We cannot stand awe-stricken in presence of Nature's majesty, we cannot melt before her beauty, and bar our thought, or restrain our homage from the Deity she speaks. He who would say "No God," first turns away from hill and vale, verdant with waving woods or bright with yellow corn; shuts out the sun, the moon, the stars, from converse with his soul; buries himself in closets, where the wooing face of Nature is unseen, her beating heart unheard. There he weaves his chain of argument, constructs his family without a father, his universe that no purpose animates, no will controls; traces laws that reveal no holiness, and bends

to a necessity that owns no love. Atheism is a disease of towns. Air and sunshine, the sight of the living tribes whom the hand supplies, the music of the winds and waves, one burst of sympathy with the mirth, the melody, the awe that are around us; these are its cure. In Nature God is felt. The consciousness of a present person awoke the reverence of the earliest times, and is stamped upon the superstitions of every race.

But this first and universal form of Nature's evidence for God, in which it exists rather as a feeling than as a thought, and is less an argument than an instinct, necessarily becomes modified as the reflective powers of men are developed. It loses something; something also it gains. The ideas gain in distinctness and in logical coherence, but the feeling weakens. The existence of a God becomes an irrefragable inference, but God Himself tends, in the process, to become to us rather an inference than an existence. He is distinguished from Nature, and therein more justly regarded, but He grows more distant. Conviction waxes, but faith wanes. Even a new order of phenomena makes its appearance. While, on the one hand, the proofs that there must be a God are elaborated with ever greater amplitude and skill; on the other, many persons of devout habits and firm belief manifest an alienation from the entire process, and the singular spectacle is seen of men contending, on behalf of religion, that Nature does not give evidence of her author. And can we hide from ourselves that the "argument from design" grows daily more difficult, more precarious, more chilling? When we turn from the glowing earth and sky to the "Treatises," do we not experience a feeling akin to disappointment? The magnificent impression is analysed into elements from which we can in no

way reconstitute the whole. We turn from a bosom warm with life to anatomise a corpse.

Perhaps the reason of this feeling is that we have read the lesson of Nature too partially: have fixed our gaze upon her thousand forms, but missed the unchanging soul. Adaptation and design are there in infinite profusion, but there is also more. There is necessity. Science consists in tracing this; it is her very life and being. The design which Nature reveals does not stand alone. It is conjoined with another element, of loftier and profounder aspect; a wedded pair of attributes. Beautiful, attractive, winning, is that fair final cause, which smiles as with mother-love upon all the creatures which the Divine wisdom formed, and the Divine bounty feeds; reverend and awful that stern law, which no passion sways, no calamity appals: upholding, as by a strong right arm, the order of God's house.

Before we attempt to reason on this fact, shall we endeavour to feel it? Shall the heart, for once, have precedence of the intellect? Has not the necessity in Nature a voice which speaks to the soul, and says: "Put off thy shoes from off thy feet, for the place whereon thou standest is holy ground"? Is it not God's character that stamps itself in these unfailing and unflinching laws on all things?—the rightness of His ways? In His creation we see His love, His wisdom, His power, His providence;—is His holiness absent? Why, of all His attributes, should that one, which sanctifies and ennobles all the rest, be wanting? Can the necessity be LAW in very deed?

There is abundant evidence that this thought is true. It not only commends itself to the feelings, it is imperative upon the intellect. The fact which is presented to us in Nature is not that of a necessity, determining certain

results and design visible in other things. The two elements coexist in the same instances, and the problem we have to solve is:—What that can be which presents to us at once the twofold aspect of designed and beneficent result, and of necessary law. A true solution must be one which includes both. A theistic solution, which takes into account the adaptation merely (however much it may be preferable on moral grounds), is as far from fulfilling the *logical* conditions of the case, as a materialistic solution which takes into account only the necessity.

For example, how often it has been referred to, and most justly, as an instance of beneficent arrangement, that ice is lighter than water; so that it floats on the surface of the seas and rivers, instead of sinking to the bottom, where it would be so much less accessible to the influence of the returning heat. It has sometimes been represented that water is exceptional in this respect, and this has been dwelt upon as evidence of a "special contrivance for useful ends." But, in fact, it is a law that the solid formed by the freezing of a liquid is lighter than that liquid; and it is, so far as we can judge, a necessary law. The expansion of a liquid as it approaches the freezing point, is consequent upon its assuming a certain structure, as proved by the effect produced upon a ray of light transmitted through it. So this useful and beneficent arrangement, the floating of ice, is seen to be a necessary law. Or, if we consider the beneficent adaptations of living structures, while the fact of the marvellous contrivance remains unshaken, it is receiving continually a new aspect, by the discovery of second causes (mechanical necessities as they appear to us), by which they are produced. The spheres of necessity and of design in Nature cannot be held separate. They tend to, and

probably will ultimately receive even from human Science, a complete identification.

But further; in Nature law is the ruler. The design is often sacrificed to the necessity, the necessity is never sacrificed to the design. Witness all defects, deformities, and monstrosities in the organic world; all disadvantage, loss, and injury arising from its relation to the inorganic. A great evil has arisen from the exclusive attention paid, by those who have devoted themselves to "natural theology," to the evidences of design, or special use: the facts, being looked at with a particular end, have not been fairly seen. The *failures* in Nature (regarded from the design point of view) are innumerable; quite innumerable, also, are the results (apparently designed) which are painful, and, to our view, evil. Law rules: beneficent design is subordinate. No gap is filled which the law does not fill; no end secured which the law does not secure; no pain remitted which the law inflicts; no failure averted which the law demands. Must not this law have a value in and for itself? a higher value, even, than the beneficent design? Must it not be that the law is the more sacred in God's sight, as the right is higher than the expedient?

Again,—if we consider our own relations to the laws of Nature, not only as sensitive but as moral creatures, we must allow that they represent something deeper than the mere chain of causes and effects which they appear to be. These laws stand as the agents in the darkest tragedies: by them not only are bodily tortures of unsurpassable severity inflicted, but hearts are crushed and wrung with fiercer agonies, and spirits capable of the highest good are sent in dark ruin to the grave. It cannot be a mechanical necessity, mere passive laws, which might be other than they are, that do these things. Not

if there be a God in heaven: an ear that is open to the cry of human anguish, a heart that throbs with sympathy for human joy or woe. It cannot be, but that a necessity is laid on God's own heart: a law which binds the Infinite Himself speaks in these laws. They are not the product of an arbitrary will any more than of blind chance. Should souls be lost, and tender affections lacerated by Him whose name is love, to preserve the law of *gravity* unbroken, or that *chemical* operations might be uniform?

Manifestly we have been thinking wrongly here. There is more in physical necessity than we have seen. Our senses, which feel the laws that surround us as if they were so much mechanical force alone, have misled us. God has hidden Himself, and we, not seeing Him, have thought and reasoned as if He were not present. The laws of Nature are His deeds, and all His deeds are right.

The express words of Scripture assert this view. "O Lord our God, how excellent are Thy works; in WISDOM hast Thou made them all." "Wisdom" is not used in Scripture to indicate mere skill, or power of attaining ends apart from a moral reference. Wisdom, in Bible language, is holiness. So I would read that passage:—"How excellent are Thy works, in holiness hast Thou made them all."

A moral necessity demanded that the worlds should be made as they were made, should be sustained as they are now sustained. The argument is of the same kind as that by which the existence of a personal God is inferred from the works of Nature. If the evidences of adaptation imply a conscious *design* in the Creator, the evidences of necessity, discovered by Science, imply a conscious *rectitude* in the Creator. The inference is based in each case on our own consciousness, and is certainly of not less validity in the latter case than in the former. In

respect to its form the argument may be variously presented. We may say: the necessity discerned in Nature indicates a necessity in God's own being. It has its basis there, and is the outcome and representative in the world of phenomena of a Divine necessity. But this necessity in the Divine being cannot be merely physical: it is not passive mechanism, but has a spiritual nature, as God is a Spirit. But a spiritual necessity is moral; a necessity of character. It is holiness. The necessity in Nature, therefore, is the expression of the holiness of God; things that are necessary are right. They are necessary, because right.

Or, we may ask (considering together the two elements of necessity and adaptation, which the investigation of Nature presents to us together), What necessity can that be from which such results arise as these which we see? What necessity can that be which has for its fruit the innumerable tribes of animals and plants, so wondrously constructed, so perfect in mutual subordination, so adapted to the conditions under which they exist, so bountifully supplied with all they need? What necessity can it be that bears such fruit? Evidently not the mechanical necessity, the mere chain of *forces*, which our feeling of it leads us to suppose. There is more in the necessity of Nature than we feel. The necessity which we have supposed excludes design: the true necessity includes it; and bears as its blossom the rejoicing world of life.

Nor is this truly difficult to understand. A necessity which bears fruits of happiness, design, and adaptation, is not unknown even to us. The necessity which is in Nature exists also in man's experience. When we *are compelled* (by the Spirit of God within us, who alone is the author of all good) to do the right, then we are partakers of it. Then we know how the worlds were framed

and what law guided the Creator's hand. And the fruits of right doing, too, we know, are those of perfect adaptation and success. When we do right, then are united in our action (as in God's) necessity and design. Then are found in its result (as in God's) unwavering law, crowned with rich harvests of beauty and of joy.

We naturally conceive of God as acting arbitrarily, and from mere choice, in His creative act: that He made the world as a man might make a steam-engine or a watch, with no moral element concerned. But this is an imperfect and untrue conception; and instead of honouring God (which is doubtless the intention) it deprives Him of His highest honour. It makes His action parallel to the lowest, and not to the highest of our own. For never does human action reach its true dignity until it is sanctified by moral law, and is made necessary by holy love. Ought we not to take this as the type of the Divine action, and not the mere exercise of skill?

And, in truth, it is wholly a false thought of creation which represents it as an exercise of skill. It is unworthy of God, unworthy of us. The analogues on which it is unconsciously based are inappropriate and false. Our exercises of skill and constructive energy, upon the materials around us, are not legitimate elements for illustrating a deed so different as the Divine prerogative of imparting existence. We rise there into a higher region, and should be careful to remember that we do so. We rise into a region where arbitrary choice and contrivance have no place, but eternal holiness reigns supreme.

This false and partial idea of creation, derived from a superficial and inadequate knowledge of the facts of Nature, has been the reason of the apparent opposition between Science and natural theology. Ever as the dis-

covery of natural law, or necessary connection, was extended, it has seemed as if the Divine action was excluded. But this is an impression due entirely to our misapprehension. It is not God who is excluded, but arbitrariness. To recognise necessity is to demonstrate Divinity. It is to give evidence of moral law, and satisfy at once the intellect and the heart.

Welcome to us, therefore, should be all that Science can do to trace law in Nature, and bind all physical events in the chain of causation. This is a process we need never fear. It does not separate any event from God, but demonstrates His action therein, proving His presence by proof of that true necessity of which physical causation is the sign. The argument from design grows larger, and embraces that which has been most opposed to it, never more to fear a foe.

And here, also, may be found one source of the weakness of what is called natural religion. Besides, the absence from it of those elements which only revelation can supply, it is not even true to itself. It does not read its own oracle aright; it misinterprets the voice of Nature. What does it tell us of that absolute and unflinching law, revealed in Nature, to which all happiness is relentlessly sacrificed? of that deep necessity of things on which all the beauty, harmony, and happiness of creation are based, and out of which they spring? In ignoring the unbending holiness of God, Deism is as false to its own origin as it is to the conscience of mankind.

But if the recognition of rightness in the necessity of Nature gives us aid towards a better understanding of the world, much more should it give us help to live in it. For what is it makes life hard, and trials bitter, but the apparent absence of God from it and them, the seeming triviality and unmeaningness of the things which affect us

so deeply. Our life seems squandered in the dust, our afflictions seem to spring up from the ground, and when, by great effort, faith has said, "It is the Lord," still we doubt and fear; the dark shadow of the second cause comes in between us and our Father, and we long for a clearer vision— ble proof that there is no accident, and we could see that the shadow itself ght, that the inexorable forces which crush us, the irbable laws which rend us and will not hear, are y instruments of God's righteousness, the en of His chariot, were not that enough for us? our faith, instructed by a better understanding of rks, hold with a firmer grasp and more implicit trust the consolations of His Word? And rising from the patriarch's confidence, which Nature has in these last days confirmed to us, "shall not the Judge of all the earth do right?" might we not see, with opened eye, the world, made by the Son of God, witnessing in every fact and law of Him? And—our experience ennobled and made sacred so—might we not emulate an apostle's faith, and say, "I glory in tribulation also"?

IX.

ON THE RELATION OF SCIENCE AND THEOLOGY.

(*To the Editor of the Christian Spectator, Dec.* 1860.)

SIR,—Will you allow me a few words on this old subject in the columns of your magazine? It has been again brought before my thoughts by various remarks which have reached me respecting the physiological views I have had the pleasure of laying before the public in the "Cornhill Magazine."[1]

I make this reference, not for the sake of bringing those views into further notoriety, but because it seems to me the best way of causing the exact question at issue to be thoroughly apprehended. I have argued, in that periodical, that the forms of plants and animals may be traced, by observation, to arise from the operation of physical conditions, and that they are largely dependent upon the resistance of the enclosures or limitations within which such plants or animals are developed. For the sake of illustration I may add another instance or two to those which are there adduced. I do not, however, pretend to bring them as proofs. The stamens of a flower, as is well known, are modified leaves, and the modification appears traceable to the resistance which the external portions of

[1] Physiological Riddles. No. 3, On Living Forms.

the flower present to their unfolding. The stamen grows to a small extent by the expansion of its lateral portions, in the same way as many young leaves, but it is then arrested; its further increase is mechanically stopped. Again, the fibres of the most highly developed form of muscle consist of long hollow tubes, which are subdivided transversely at minute intervals, on which account they are called "striated." Their appearance may be likened to that of a ladder. The transverse divisions form by gradually increasing projections from each side of the fibre, which finally unite in the centre. It is evident that this result might ensue mechanically, from the increase of the inner of the two membranes of which the fibre consists, supposing the outer one not to increase to an equal extent. And there is reason to believe that this is the mode in which the striation is effected.

It seems to me that by such views as these a new source of wonder and delight in creative wisdom is opened to the devout mind. For let the position be granted, as proved, or made probable, and what follows? Surely, for one thing, an entirely new evidence of design in the structure of the organic world. Innumerable parts, and arrangements of parts, which before might have seemed barren of meaning or of use, are raised into the rank of essential elements in a perfect and well-ordered scheme. Of what visible use, for example, is the calyx of a flower, if it be not the means (by its restraint on the expansion of the internal parts) of determining their forms? Would the plant be a more perfect exhibition of skill if the calyx had no office, and if the flower would have been as completely developed without it? For it is to be observed that in the majority of flowers, the function of the calyx, whatever it may be, ceases with the full expansion of the bud. It is true this is a very simple case; but it is on

perfectly simple cases that the proof of such a position as this must depend. And if the function of the calyx in shaping the flower be recognised, the entire principle is granted. For then, must it not be allowed to be a yet more perfect exhibition of creative skill that there should be something which had for its office, or part of its office, to *shape the calyx?*

Again; is it not adduced as an eminent argument in natural theology, that the heart and veins are provided with valves which determine the course of the blood in one direction only? These valves, together with the mechanical force of the heart, make the circulation a matter of physical necessity. And this, as I understand it, is the proof adduced of the Divine wisdom. The circulation being an essential condition for the higher forms of animal life, the Creator has provided that it shall be rendered physically necessary. He has used means which on mechanical principles insure that end. The result does not come by chance, because the provision for it can be traced and demonstrated. Is not this the argument?

It is at least an argument that carries with it my full conviction. But, then, if the making the circulation mechanically necessary by heart and valves is a proof of Divinity, must it not be a still higher proof of the same if the heart and valves themselves can also be shown to be made mechanically necessary? What is this but a further extension of the same line of argument? Why should we stop, or desire to stop, at this particular point? Above all, why should the very same argument seem to us, in two cases so immediately connected, to be of opposite tendency? I affirm that it can be shown that the heart does not come by chance; its spiral form, its "septa" (or the partitions which divide it into distinct cavities), and other points in its formation may be demonstrably

shown to be planned, and to be brought about by means of physical conditions in the structure and circumstances of the embryo, as is the circulation by means of the structure of the veins. Surely this is a truly religious thought. It gives, as I have said, meaning and use, and stamps with the mark of forethought facts in the history of organic life which have hitherto had no message to us from their Creator.

Nor must we imagine that any line can be drawn in this course of investigation; that we may say, certain organs, or forms, in living things may be shown to be determined by physical causes, but certain others cannot. The whole force of the proof in any one case bears universally. The use of mechanical means for the production of organic forms, if it be a fact at all, is a law and not an exception. It is the very essence of the embryonic or developing state, through which every living creature passes; each individual of the animal and vegetable tribes goes through this period of immaturity, because the physical causes to which the imparting of its form is assigned require time to operate. If it were not thus, why should not its perfect structure exist from the first? To what end are the multiform changes which every embryo undergoes, unless it be that its development is achieved by means which operate only under certain conditions; and of which those various changes exhibit the undeviating influence? Why should it be an ordinance of the Creator, that the animal or vegetable structure should be attained only through a certain series of changes, not all of them by any means beautiful to our eye—nay, that if this series be interfered with, or broken, the designed structure, however beautiful or useful, shall not be attained at all—unless it exhibits the working of appointed means, which He will not forego, and expresses

His adherence to His law. The same law, surely, which He has not only engraved on every particle of inorganic matter, but has written in lines of unwavering severity in our own experience, that before any result however longed for, however good, shall be, it shall be first made necessary.

"Do you desire any end? Then take the pains to make it necessary according to the powers and properties of things." This is God's plain message and decree to us, His creatures, whom He desires, as His highest gift, to make like Himself. Is it not, then, a worthy, nay, a tender and delightful thought, vouching for chords of sympathy and bonds of union between us and our Father, yet unfelt in their true depth and sweetness, that this is the very law which He adopts in His own working? Not acting in one way Himself, and bidding us act in another; but sternly, unrelentingly for cries or tears, or the outpouring of our heart's blood, or blackness of our despair, compelling us to learn His lesson, and to fulfil law like Him. Sternly and unrelentingly? Let me rather say with throbbing heart of deepest pity, but with a love, stronger than pity, that craves, and will not be denied, the oneness of our souls with Him, and eyes that see that future time as now, when He shall wipe away all tears from ours; rejoicing more than we, for in heaven never are the words of the Lord Jesus forgotten, which He said, "It is more blessed to give than to receive."

But I am anticipating my thoughts. The link which connects the revelation of God's work in Nature with the revelation of Himself in Christ, is to my feelings so close and so full of meaning, that my ideas pass involuntarily from the one to the other. I cannot contemplate Nature as it is made known by Science, without an awe and delight which are not to be divorced from that vision of

the Divine with which God has joined all that is highest and most blissful. But the argument I have been urging requires to be prosecuted somewhat further. It gives us, doubtless, a glorious conception of God as the Creator, to recognise in all the processes of organic life, down to the very least and apparently most insignificant, an arrangement of adapted and mutually necessary elements, and to trace its exquisitely beautiful and multitudinous results to means of which the simplicity almost renders us ashamed of our highest feelings of amazement and adoration. This is something; but it is not all. It is indeed the least part of the overwhelming revelation. For while an entirely new apprehension of life is given us, in the perception that every organ and structure is caused to be by determinate conditions present in the organic world, and thus exhibits law in its existence as well as in its use, a new light is cast also on the world that is termed inorganic. For the dependence of the structure of living things on causes which we term mechanical, cannot be limited to the bounds within which we have been accustomed to confine our idea of life. As scientific exploration shows that the vital force is derived from the inorganic world, and is but a special form of common forces, such as those which flow to us from the sun (heat, light, and the chemical force called actinism); so in recognising the part played by mechanical conditions in determining vital forms, Science also breaks through this line. The conditions which physically determine form in the organic world, have been themselves physically determined, and point to an origin in inorganic forces. The forms of life are involved as a consequence in the structure and composition of the globe.

I think that on the clear showing of Science we cannot stop short of this position; and I am quite sure that on

grounds of religion we ought to rejoice to take it. For what is its legitimate effect?—to make life less to us?—to rob its unutterable beauties of their charm, its unparalleled adaptations of their lesson? It seems to me that nothing but a real though latent unbelief could fancy so. Are or are not the evidences of design in the organic frame positive and unquestionable proofs of a Creator, certainly not lower in the ranks of intelligence than ourselves? If they are, then how can they cease to be so through any discovery respecting the mode in which it has pleased that Creator to effect them? If, on the other hand, these "evidences of design" are evidences only on a particular supposition respecting their mode of production, is not the entire argument merely a vicious circle? And, indeed, unless there be some latent misgiving in the minds of those who use it in this way, it is difficult to understand why they should seem so fearful, or be so prone to meet argument in favour of the production of vital forms through law, with angry words. Far be it from me to reduce to such paltry inefficacy the "argument from design." I hold it absolute; and affirm that on no conceivable hypothesis can the demonstration of a Creator, a personal Creator (though I would rather say The Creative Person), given by the facts of organic life, have its force in the least degree diminished. Much we may learn, indeed, by study of the means employed by Him, respecting Himself, His ways, the scope and sweep, so to speak, of His activity; anything that would dim the brightness of His presence, or render the stamp of His workmanship less palpable, never! It cannot be. There is no *adaptation* in the case. There never was a more visionary terror than the fear that the putting back God's "direct" action by Science, tended or could tend to exclude HIM.

What then does it do? Exactly what we should wish

to see done. It brings back the direct action of the Creator everywhere, and into everything. What would come of trying to sweep away the ocean? In our ignorance we divide natural events into two classes, those which God does directly, and those which are only indirectly done by Him. Science makes us know that God directly does them all; by showing us that those which we do, modestly, ascribe to Him—meting out, as so well becomes us, the bounds of His activity—are done in the same way as those from the burden of which we have exonerated Him. Science puts to us this question: "Does God *not* do this, on which you feel the stamp of Divinity so strong, or does He also do this other, on which you have, as yet, not apprehended it at all; for both are one?" What response it has elicited we know; and what it shall yet elicit we may well be sure. For it shall teach us, has taught us in part already, and shall teach us still more perfectly, to know that as they looked in vain for God, who sought Him as an earthly king, and they only knew Him who recognised His kingship in humility and suffering, and owned His mightiest triumph, when, to fulfil the Law, His head was bowed to death; so do they vainly seek the Divine in Nature who look for it in arbitrary acts of power; that the true stamp and mark of Godhead, the sign manual of the King of Heaven, on all His works, is law.

And teaching us this, Science frees us from a delusion, that is natural to us, indeed, but happily not unescapable. It shows us that the ordinary events which occur to us are, not by any overruling or as a matter of faith, but literally and in strictness, divinely sent; that they are none the less divine because we can see their causes. It elevates and fills with a religious grandeur that part of Nature which we most need to find religious, but from

which our perverted feeling tends to banish all that can nourish religious life—the ordinary events of our daily experience. On moral grounds, that idea of Nature which recognises the specially divine in special and *uncaused* events, is utterly to be condemned The grandest work of Science is to make daily life religious.

There is another point of view in which the reference of organic form to causes seated in the inorganic world is favourable to piety, and that is by the vast elevation it gives to our conception of the universe, and therein of the Divine power. In this respect it is the correlative of the extension given to our thoughts by the discoveries of the telescope on the one hand, and the microscope on the other. It supplies the element needful to give these new revelations of creative energy their full value and completeness, adding to the exhibition of extent and variety that quality of exquisite perfection and profound harmony—the operation of that attribute of Divinity which we so unworthily express by the word "design"—without which they are yet imperfect. For if the organic world, with all the adaptations that characterise it, springs from the connection of things in the inorganic, what is the inference—the necessary and unavoidable inference? Evidently that this characteristic of profound and perfect adaptation, of inconceivable and boundless delicacy of adjustment and subservience to use, which seems to us to distinguish the organic from the inorganic, and give the former so immeasurable a superiority over the latter, that this characteristic belongs also and equally to the inorganic. The world of organic life is not different from, or above, the rest of Nature in these grand properties, but is a special revelation to us of what is common to the whole; only in what we call "living" things do we see aright how glorious Nature is. We are blind to the im-

press of Divinity that is in her, except where it is shown us on a small scale, in particular organisms; on a scale small enough not to surpass the limits of our vision. And where we say, "How beautiful!" may we not well believe there are beings who would rather be disposed to say, if they did not reverence too well the loving End, "How paltry!"

Does it not impress the mind with a sense of overwhelming wonder to conceive that every part of Nature is pervaded by the exact and complex harmonies which animal life exhibits to us; must be so pervaded, because those very harmonies result, and express themselves, in that life? Is it not a joy to feel ourselves warranted in interpreting the seeming dead by the evidently living, and to know that the highest conception of His power, wisdom, love, which we gather from the works of God, is true of all His works: or false, only because even that falls short so far. It is like the new feeling which the dimensions that modern astronomy reveals excite within us—astonishment, and almost unwillingness to believe, until we rebuke the pride which tempts us to suppose that what seems incredibly magnificent to us must be hard to our Maker.

All the complex harmony of life is everywhere in Nature, though unperceived by us until we look through the eyes of Science. We do not feel its presence till we have realised its evidence by earnest thought; but then we carry the solemn impression ever with us, and the universe is more to us from that time forth.

I must bring this letter to a conclusion, although there are many other aspects of this subject which are exceedingly interesting. For one thing, the vexed question of "Force" receives a final answer in the confirmation which our moral nature adds to the evidence of reason There

is nothing in which the researches of scientific men, and the deductions of philosophy, more completely unite than in the doctrine that our feeling of "force" does not answer to any existence in Nature, but rests on our own constitution, like the sensations of colour, of sound, or of taste. Our feeling of exertion, or resistance, implies no *force* in Nature, as our feeling of pleasure or of pain implies no *sensation* there. But this doctrine, simple enough though it be, and evident enough on consideration, yet meets with a difficulty in being received, because it seems to dissolve the link between cause and effect, and to deny the true connection of events which we feel to be dependent upon one another. It reduces, in fact, the course of physical events to an *order*, and denies to the physical objects, or their properties, power to produce the effects that appear to result from them. This conflict between our feeling and the evidence which investigation brings, might seem hard to decide; but how emphatically and conclusively a deeper and truer feeling within us gives its verdict in favour of the latter! We bear witness against ourselves. That natural events reveal an order, and do not contain the power which determines them, is the deepest and most irrepressible assertion of the heart. This assurance is the comfort of the mourner, the strength of the martyr, the confidence of the believer. All that is not sense within us cries out and shouts with joy and satisfaction at the report—a report which the senses themselves do make. They have explored the realm of sense, and bring back answer—Power is not there. Not there, reply the conscience and the heart; power is His alone who sitteth in the heavens, and doeth according to the pleasure of His own will.

The course of Nature is an order only. This sets aside at once all that has ever been said about second causes

as antithetic to the Divine action. The *second* cause is truly only an *apparent* cause. No possible interlinking of events, or tracing the law of causation through what phenomena soever, can put the Divine farther off from us. Such discoveries may reveal to us more and more of the met reator—they may even throw a lig id, if we may trust the experience shall be rich with such fruits as th o more.

X.

ON THE RELATION OF SCIENCE AND PHILOSOPHY.

(*January* 1861.)

I HAVE often felt that the value of the facts, and still more of the principles, with which, in recent times, Science has enriched human thought, has never yet been fully appreciated, and especially that the aid they are calculated to afford in the prosecution of inquiries which are not included in the sphere of Science strictly so called, has been greatly overlooked. I may take one characteristic of scientific investigation as an instance:—the distrust with which the impressions conveyed by the senses are treated. In the pursuit of physical truth men have learnt this lesson, to repose no confidence in the ideas which are first and most naturally suggested to them by their experience; but to use all such impressions as subjects for testing and examination, maintaining the mind —until such testing has been carried out—in a state of doubt or equilibrium. Science accepts as its guiding principle that man's tendency is towards error, and guards against taking the apparent for the true, as the chief and mortal foe of knowledge. What can seem less likely, for example, than that the saltness of the ocean should be due to the influx of fresh water, that is, to the saline

matter carried into it by the rivers? or that the strata of lofty mountains should have been deposited beneath the sea? Science accustoms men to abandon, it demands as its first condition that they should abandon all confidence in that which naturally seems certain, and look to the pati[illegible]ited faculties of observation and o[illegible]nds of their belief. So much is t[illegible]gh Miller observes,[1] "It has been w[illegible]n two opposing explanations of extra[illegible]enomena are given, one of simple a[illegible]non-sense character, the other complex, a[illegible]urd; it is almost always safer to adopt the appar[illegible]urd, than the seemingly common-sense one." These principles are so familiar, that they have become common-place; yet their application has been limited. There is at least one branch of inquiry to which they are not applied. Science investigates particular things; the forms, weights, and motions of the heavenly bodies, electricity, light, heat, the chemical composition of all substances, the laws of life, &c.; but, rising above and extending beyond all these special topics, there appeals to the human intellect another question, "What is the essential nature of that which is around us? What are we ourselves, and what is the universe? Are all things such as they seem, or if not, what is the reality of them?" This is the question of philosophy.

Philosophy is related to Science somewhat as the whole is related to the part. It asks, respecting the whole, the same questions that Science asks respecting particular objects, or classes of objects, and seeks to do in respect to *existence* what Science does for the relations of individual things.

Now we are impelled by an inevitable instinct to ask

[1] Testimony of the Rocks, p. 297.

these questions, and to engage in this pursuit. Science may be limited to a few, but we are all of us philosophers. Whether we will or not, we make for ourselves, or adopt from others, an idea respecting existence, and decide positively on the question whether things are or are not what they seem. And we have, besides, a feeling which no one can escape, and which seems to me to be emphatically just, that the question of *existence* is truly a religious question, and that, with the answer to it, are connected the most momentous moral and spiritual issues.

But how are we to attempt to answer the questions which are thus raised before us? Are we to be guided by the example which Science shows us, and mistrust our natural convictions, or are we to adhere to them, and what we tend strongly to believe are we to hold as true? This is the question I would raise. In all humility, I would attempt to answer it. In all humility; for if we are not humble in the presence of questions such as these, what power could elevate us from our abyss of pride? Never does the consciousness of utter weakness press so painfully upon the heart, as when we gird ourselves to grapple with these highest problems, from which yet we may not shrink. We may not shrink; for God's hand visibly beckons us on, and His voice within our conscience forbids us to turn back. To refuse to try is not to be humble; it is pride, rather, that will not incur the risk of failure. And besides, the world has ever advanced through doubt and fear, and efforts made in sorrow or despair; in pain and weakness Truth is born.

I believe that the principles by which Science is guided, and which have been proved true in its domain (namely, that our impressions, however strong, are not to be taken as true, but are to be corrected by the conjoined use of all our faculties), will be found our true guide in philosophy

also:—that the law which is true for the parts is also true for the whole. The history of thought, and the nature of the case, alike confirm this view. For though I said just now that all men are philosophers by nature, inasmuch as all have a belief respecting existence, yet the opinion is widely entertained that we cannot have a philosophy properly so-called, that is, a true knowledge of existence apart from appearances. This doctrine has been brought prominently into notice by the elaborate application of the principle, in Mr. Mansel's hands, to the questions of practical theology; but it is held by various schools of thought, and, curiously, is for the most part found united with views respecting Divine things, the reverse of those which Mr. Mansel seeks to establish by its means. I do not intend here to re-open the Manselian controversy; yet it seems natural, in passing, to remark that a principle which, so far as we can judge from facts, appears to work with equal facility each way, and to be relied upon at least as much by the most thorough unbelievers as by their opponents, hardly seems the most suitable foundation for religious faith. Mr. Mansel, before he begins to build, thoroughly clears away all rubbish; and this, we grant, is well; but we tremble while we ask, if he have not also undermined the foundation.

Let us, however, be just to him. The undermining, if undermining there be, is not Mr. Mansel's doing. He has adopted, not originated, the principle that in very truth we cannot know. There is an overwhelming consent of the most commanding intellects, in modern times, in affirmation of the doctrine, and the evidence on which it rests is in its own way unassailable unless some entirely new point of view can be taken. In addition to the logical proofs of the inconceivableness of the Infinite, and the contradictions which arise when we endeavour to

reconcile the idea of God as infinite with the existence of *other* beings than Himself,—in addition to all this, there is the broad fact, which is evident on reflection, that our knowledge must be determined by, and related to, our faculties. Knowledge, as it is in our experience, is not a pure and simple thing. Two factors evidently enter into it: the object to be known, and the being who is to know. The apprehension we obtain of any object expresses the effect of that object upon us, not what it is in itself. The senses of sight, hearing, &c., illustrate this fact. The colour which we see, the sound which we hear, the savour which we taste, are admitted not to be representations of that which is external. They are resultants of the external object, and our peculiar sensitive capacity. It is said to be *motion* which makes us perceive light and sound; probably it is equally motion which causes us to perceive taste or odour. The general proposition has been summed up in an illustration. Our knowledge or apprehension of things, it is said, is like a chemical process, in which the resulting compound differs from, and indeed may be utterly unlike, both of the elements. As oxygen and hydrogen unite to form water, so do we, the percipients, and the object perceived, unite in the impression—sensuous or intellectual—which we call knowledge. That impression can no more answer to the object supposed to be known, than water can be the same as hydrogen alone, or oxygen alone. Our apprehension of things therefore, cannot, it is said, be true.

A similar conclusion may be arrived at by a somewhat different course, and by an argument which may carry more general conviction, as being based upon a fact which it does not even require reflection to perceive. Whether our faculties have or have not qualities which give their own hue to the things apprehended by their means, they

are certainly limited, partial, narrow in their range, and imperfect in their depth. Even if it were granted that our perception is accurate, so far as it extends, it is at least imperfect, it does not embrace all objects, it does not cover all that is to be known of any. Now, imperfect knowledge is always so far false that it necessarily issues in error. However true it may be so far as it goes, delusion or mistake is its unavoidable result; that is, if any conclusions are based upon it at all. It is very curious that this should have been questioned in respect to philosophy, when it is so perfectly well understood in practical life. How does a barrister, on the wrong side, try to deceive a jury? Is it not by giving them a partial knowledge of the facts? Does he not try to fix their attention on certain circumstances of the case, omitting others which are not less essential? In truth, the correctness, so far as it goes of an imperfect knowledge, is the most efficient of all agents in deceiving. Partial facts falsely presented might, by chance, lead to a right conclusion; the twist given to some might—by accident or by design—counterbalance the absence of others; but partial facts, truly presented, must, just in proportion to their partialness, involve delusion. An illustration, which is none the worse for being mechanical, may render this argument clearer; a ball acted upon by various forces moves in a line between them to a certain point, exactly determined by their relative amount of each; but if any of these forces be absent, it will move to another point. Now the mind is influenced in a similar way by the facts which operate upon it; if any of those which would conduct it to truth are wanting, it will inevitably be carried to another point, which, whatever else it may be, is not truth.

I infer, therefore, absolutely, that from the known

partialness of our apprehension of existence there must arise, not partial knowledge merely, but error; or at least an inevitable tendency to error as soon as we begin to draw conclusions. Of all ways the very surest is taken to lead to that result. It must have been *designed* in our very constitution and circumstances.

Men were meant to err, as soon as they began to think. The forces are all arranged for producing that result. Nature stands like a false counsellor before them, with deliberate intention to deceive; and they, with unsuspicious innocence, jump eagerly at the false conclusions it suggests. And it is to be observed, that this necessity of being deceived becomes stronger and more lasting precisely in proportion to the magnitude of the object with which we deal. It is proportioned to the disproportion of our knowledge. Evidently, therefore, it must be greatest—our tendency to err the most inevitable and inveterate—in respect to that subject which is the largest of all; the problem of philosophy—"What is existence? What is it that exists?"

There is a curious fact, of which I think my reader will become conscious in himself, if he will take the trouble of reflecting for a moment: he will find that he has a tendency to think just in the opposite way to this; and that while he willingly concedes his liability to be deceived in reference to particular things, he is very prone to feel sure that he is not subject to deception respecting existence as a whole. In fact, just where his knowledge is really least and most inadequate, his assurance waxes strongest. The minimum of means seems to yield the maximum of result.

So prone indeed are we to be confident on this point, and to take for granted that we are not liable to be mistaken in our general ideas, that it seems to us almost

impious to question whether the fact be so. We are apt to argue thus:—"Granting that our imperfection forbids our having a full and complete discernment of existence, why should we doubt that our discernment is right so far as it goes? It is incomparably more likely that things (not indiv ntire system) are what they seem Why believe that we are gratuit uded? God made the universe; gave us powers whereby to discern o think that He did so in a fashion deceitful, that we can only discern

That is, r haste) to think that it would be a hard case if God ...d not contradicted the nature of things, and violated the mental laws, to suit our convenience.

There is surely here something worth inquiry. Why should we feel so certain, where the proper grounds of certainty are so defective? And might there not be a better plan of thinking? It would be a pity to shut up such an inquiry as this by the vague assertion that our tendency to feel sure, on this question of existence, is evidence of its own truth; and that, in short, the seal of the highest authority should be set upon the argument, "It is because it is." Surely we can do better than that. And we may be the more disposed to seek a little further, when we call to mind that a confident assurance is a characteristic fruit of ignorance. It is the nature of want of knowledge, to make men, not doubtful, but dogmatic. The man who knows is emphatically the man who either shows reason, or abstains from affirmation. We need not, therefore, attach much weight to our positive conviction that we understand existence. Our ignorance being so profound, might it not have been

expected? Does it need anything but ignorance to explain it?

Let me try to illustrate this point by a parallel case. Our ignorance, I say, is a known fact, and also the tendency of ignorance to produce confident dogmatism is known; it is proved every day in ordinary life. These known facts, then, I would apply to explain our tendency to be confidently dogmatic respecting the nature of things. Is not this, in a humble and far-off way (and I have no hesitation in making the reference; for if we may use the works of God for illustration of our thoughts, why should we not use the highest achievements of man? Nay, the greatest work of man is ever greatest in this, that it is parallel with, and capable of throwing light upon, the common and ordinary things)—is not the explanation of our confident assurance by our known ignorance, instead of by some special faculty, say of intuition or whatever else, like the explanation of the planetary motions by the known fact of the tendency of bodies to fall to the surface of the earth, instead of supposing some wholly peculiar virtue in the sun, or elsewhere, to produce their revolutions? As the known "weight" of bodies unfolds the nature of the planetary motions, so does the known ignorance of man, in respect to existence, unfold the nature of his confidence thereon.

But if our natural convictions are not trustworthy, are we without guidance, and lost in a maze of doubt? By no means. It is a strange thing man should have supposed himself in possession of a natural knowledge in respect to existence; but it is no less strange that he should think that, for the true purposes of knowledge, he ought to possess it. We may see that he ought not. He ought to have what facts prove that he has; false

impressions, tendencies to err—with the power of correcting them.

It is here that Science affords us such help and guidance. For Science, as we have seen, wholly consists in gaining true knowledge from false impressions, and has for its ground he conviction that our natural tende error. It is a striking thing that th ...e ca ience originated in the establishment ots this doctrine. Why then should f llow where her sister has achieved so br ... a ?

But besides our li perience tends to mislead us also on another Born in a scientific age, when scientific maxims and modes of proceeding have become the common heritage of the race, we are apt to forget that these are a late acquisition. We admit, so readily, that we are apt to err on matters of detail, that we fancy, or are disposed to act as if we fancied, men were always aware of this. But we know well that it took long to teach them; we know well that nations untrained to scientific ways have not learnt it yet. They are still sure wherever they are ignorant. It is not more "natural" to man to be confident respecting existence as a whole, than it is to be confident respecting individual things. He can, also, as well be cured of the one confidence as of the other.

He can be cured of the one because he has been cured of the other. Science is the appointed physician of the sick philosophy; sick, as has been supposed by many, unto death. It is true the fever heats of a vain confidence contend in long succession with deadly chills of sceptical despair; and each so generate the other that it seems as if the fatal oscillation could never end. Yet to what does disease testify but to health? The pallid

rigour and the parching heat are but the balanced powers of life, set in unnatural array against each other. These hostile forces conspire and unite in health. And so the contradictions also of our thought shall be seen one in living unity.

For out of the eater comes forth meat, and from the destroyer sweetness. It is the very discovery that our impressions cannot be trusted, that gives a firm standing ground to philosophy. Here, as ever, doubt is the source of confidence; it is the appointed means by which the door is opened to admit more light, the shadow which the coming knowledge casts before it. For the thought that our impressions of existence are not to be received as true, needs only to be boldly faced, and all that might seem dangerous in it disappears. Accepted, it takes its place among our other thoughts quite simply, and without violence to any. The incorrectness of our perception is one of those things that look formidable at a distance, but turn out to be quite harmless when approached. It arises not from a "blundering" or bad contrivance on the Creator's part, but has been appointed, to subserve evident, and most desirable, as well as necessary ends. We need only recall the facts of our ordinary experience to see this. How can we be consciously brought into relation with very large objects, except by perceiving them as they are not? How can we, for instance, take in the view of an extensive landscape, except by seeing the objects it contains differently from what they are? Why are the impressions of sight modified, and altered from the truth of things, except that, by fulfilling this condition, they may give us larger, and therein truer knowledge than we could otherwise attain? There is a sufficient reason why our impressions of existence are not true: they are false, as the impressions of sight are false,

that we may thereby be related to a larger object, and have the means of more truly *knowing*. For we must never forget, that our impressions and our knowledge are two things quite distinct. Impressions, natural convictions (whether "intuitive" or not), are not knowledge; they are the means of knowledge. And the problem of philosophy is—from false impressions to obtain true knowledge.

It is thus made one with Science; becomes a branch of Science, or rather gathers up Science into itself, using all subordinate inquiries as means and materials for its grand guest. For in accepting this as its business, to gain a knowledge of the truth from impressions which are not true (but which are inadequate and therein falsified, and which are modified by the nature of our own percipient faculties, and are therein also falsified), philosophy adopts the methods of Science, and enters on the path which has been proved to lead to certainty.

Of the means by which this inquiry is to be prosecuted, and the results to which it promises to lead, I hope to have something to say hereafter. At present it is enough, if I have made it clear that there is nothing unreasonable in taking this attitude towards the questions with which philosophy deals, and demanding that our impressions should be held as materials for learning, and not as authorities. A path is thus opened out before us, which is full of the richest interest, and problems which have fascinated the human mind in all ages, present themselves to us in new forms, and with wholly new prospects of success. "What are we? Why have we these feelings, this consciousness? What are the objects with which we have to do?" All these questions show themselves capable of new answers, and of altogether fresh investigation, when we accept as our basis and starting-point, that

our natural impressions on these points are modified and insufficient, and are to be taken merely as data in an inquiry which may lead us to results altogether different from those from which we start. We may have misgivings lest such a pursuit should lead us into darkness instead of light; but there is no real justification for them, for then only do we fulfil the conditions for obtaining light. Both reason and experience promise a different issue. The plan is evidently accordant with the nature of things; it is appropriate to our faculties and to the relations in which we are placed; and so far as experience extends, it has always succeeded. Wherever this method has been tried, there has arisen a Science; knowledge, certainty, and power, have taken the place of dispute and failure.

But what is meant by our impressions in respect to existence being untrue? Simply this; that we naturally attach to the objects we are conscious of perceiving, an idea which is not suitable to their nature. We think of them as *existing;* we should think of them as being *felt to exist* by us, and should remember that these are two distinct things. Rightly we hold that there is existence, and that we are in relation with it, feel it, and are made conscious by it; wrongly we hold that this existence pertains to objects which answer to our impressions. To them it belongs only to answer to certain faculties of ours; to exist in relation to a mode of apprehension which is partial and untrue. They are signs and revealers of something which is higher and more than they, and of which we have to learn by means of them. There is a certain repugnance in us to admit this idea, yet it is simply the expression of that which we all feel. Our senses and our higher faculties unite in affirming it. We are conscious that the material objects around us

answer to our feeling and apprehension; we are well assured that our feeling and apprehension fall short of the reality.

I have argued for nothing more than this. And what I would fain seek is, *in what way* our feeling and apprehension thus ... ly a reasonable search. We can of ... tand more of a thing than we can ... hend by any perceptive faculty. W ... this possible, also, with respect to ... I feel that reason does not conden ... l make, nor reverence forbid it.

XI.

THE TWO WORLDS.

(*February* 1861.)

In my last letter I argued that we are endowed with certain faculties which give us untrue impressions; and I tried to show that this might be the case. I also just referred to a consideration which seems to me to indicate that it is a good and desirable thing for us to receive impressions that are not true; namely, that thus we are brought into larger relations than would else be possible, and are placed in a position to acquire a more extended and truer knowledge than could in any other way be given us:—knowledge, rightly so called, coming not first but last, and like true holiness being bestowed on man, not passively, but as the fruit of earnest labour, the reward of obedient toil. There is an illustration of this position, which is so simple and yet so suggestive, that though I can only present it very imperfectly, I think I may venture to submit it to the candour of the reader.

We gain our knowledge respecting all material objects chiefly through two senses—sight and touch. Now, these two senses give us very different impressions of the same object. Our apprehension of a solid by the eye may be utterly unlike our apprehension of it by the hand. This will be readily granted; and also that, speaking in general

terms, the touch gives us an apprehension of the object as it is, the sight of an appearance merely. Apprehension by touch is in a certain sense true—substantial; that by the eye is modified and altered.

The same idea may be expressed in another way. That which we consciously and directly perceive by touch is the thing itself; that which we immediately perceive by sight is not the thing, but an appearance. And we have to use the sight in a considerate and reflective way, and to refer the impressions received by it, to those conveyed by touch, as a standard, in order to interpret them, and make them the means of true information. If the reader will reflect, I think he will be conscious that he always judges by his eye with a latent reference to his tactile impressions; and that, whatever object he sees, he presents it, more or less distinctly, to his mind, as it would be if he touched it.

The eye requires educating; and when educated it is to be not immediately relied upon, but *used;* and used with reference to a faculty different from itself.

We are, in short, related to all objects of sensuous apprehension in two modes, or by two means, one of which is subordinate to the other, and only gives us true knowledge when it is made to speak another language than its own. Now, why should there not be a harmony between man's relation to the individual objects which surround him, and his relation to the great and mysterious universe of which he is a denizen? Is there one law for one part of our experience, and another law for another part of it? or, is not our condition in respect to the whole of things similar to our condition in respect to particulars? If God has given us two means of apprehending particular sensuous things, neither of which could suffice without the other, may He not have given

us also two means of apprehending existence as a whole? If this were the case, let us observe what would follow, namely, that one means by which we perceive existence, would present it to us, *as it is not;* one faculty, or class of faculties, would deal directly with appearances, and ought not to be immediately relied upon. And certain of our impressions respecting the whole of things would be not true, and would require to be interpreted, and made to speak a new language.

I believe that God has made us so; and that we do apprehend existence by two faculties, one of which answers to sight and the other to touch. These are respectively the intellectual and the spiritual faculties of man. Intellect (and sense with it) answers to sight; the conscience, the moral apprehension, the spiritual appreciation, answer to touch. The former faculty is subordinate to, and is to be interpreted by, the latter. Like sight, the intellect is to be not directly relied upon, but *used*, and made to teach us more than itself conveys.

If we adopt this view, a great consequence follows. Instead of thinking that we are in two worlds, a physical and a spiritual one (as all religious men affirm), we shall think that we are in *one* world apprehended by two faculties. The physical world will become to our regard, no more a distinct existence, opposed to the spiritual, but that spiritual itself, as apprehended by faculties which perceive but the appearances of things, and present them to us not as they are. These two worlds—that which intellect (using sense as its servant) *sees* on the one hand, and that which conscience and the other faculties which relate us to the spiritual, *feel* and touch, upon the other —will unite and coalesce into one; presented to us in a twofold way—as material objects are—that we may better, more truly, and more fully apprehend it.

But is this is the case, why do we not know it? Why do we feel it so? Why have men always believed these worlds, of sense and of spirit, to be essentially different worlds, instead of being one the reality, the other the appearance? Why do we still feel them two, and find it s[illegible]?

It is illustration bears. The question [illegible] worlds of sense and of spirit a[illegible] and think them two? And the [illegible] Because we have not yet learnt to u[illegible] our sense and intellect—aright, and [illegible] relation to the deeper faculties [illegible] human race has been, in this respect, as a man is [illegible] infancy.

May I not be pardoned the harmless eccentricity of thinking metaphysics an amusing study? I do not mean that ambitious metaphysics which soars in clouds of abstractions, and discusses in infinite detail the logical relations of the obscurest ideas; nor that modern science of psychology, which analyses into their elements all the "processes" of the mind, and spreads out before us, as its ultimate result, the human soul neatly tied up in parcels, duly labelled, for convenient use. This may be highly necessary, but it is not exhilarating; let us hope its fruit will be found greater than its fascination. But that metaphysics which has its feet on the ground, though its head is erect to heaven; which seeks its food and sustenance among the facts of daily life, and the common experience of men, yet uses the strength thus given for purposes of lofty thought, which bring it through unforbidden paths into communion with creative wisdom—this metaphysics, I cannot but believe, has charms which need only to be known to be delighted in. Why need men have invented such hard words, and run through

such rounds of speculation (we cannot tell where we are when we have got through them, we are so giddy), to explain the laws of man's perception, and account for the mysterious contradictions of his experience, when a baby shows it all?

A baby? Let the reader judge. Let him ask himself what a baby *thinks*, what it learns, in the first few months of life, before it begins to speak. Its mind is certainly active. Most important advances take place in it. We may not only be sure that this must be the case; we may even see that it is so. Look at the infant. Note its gravity, its intent sedateness, its air and attitude of earnest thought. Do these things indicate a vacant mind? Are not mighty problems pondered in that little head, grave discussions carried on, and serious resolutions taken? No one can doubt it. I know a most judicious grandmother, who always gives this caution to young heads of families: "My dear, never disturb the baby while it is thinking. You impede the development of its mind. Let it go through its little puzzles in its own time and way." (Thank God for grandmothers!)

But do we know *what* the problems are which it thus works out, or what preparation is made, during that great epoch when the world is yet new to it, for its future life?

I will venture a guess upon the subject:—it learns to interpret sight by touch, and to know that the objects it sees and those it feels are the same.

Every one is aware that when his eyes are not rightly directed to any object, he sees it (if he see it at all) *double*. If we hold a finger between our eyes and a book that we are reading, for example, we see more or less distinctly two fingers. Or if, while we are looking at any near object, we suffer our thoughts to wander, and

the eyes t fall quite passively upon it, we shall find that two objects are seen. It is only by practice that we so use our eyes as to see things singly; by an effort which long use has made unconscious. The child, not having learnt to make this effort, naturally, at first, sees double. I that this is the case in the inabi manifest to grasp, immediately, before them. Let any one try, w his eyes in that state in which the touch the object which he thus perceives that, whichever of the two images l hand will pass to one or the other side will be grasping after it with the same apparent inability to direct his muscles which is manifested by the infant.

If then the child sees objects double, we shall easily understand what an effect follows upon its little mind. Of course, it will not know that there is only one object when it sees two. It will think, so far as it can think at all, that the two things it sees are two distinct things; but at the same time it will touch only one; and thus, there will be a clear contradiction, to it, between its senses of sight and touch. I do not mean to say that the child clearly thinks out the matter in this way, or indeed at all employs its reason on the subject; but the practical effect must be the same. Now, from these things it follows, that the child must feel itself to be at one and the same time in two distinct worlds: the sight-world and the touch-world. And these worlds will not at all agree with each other. They are indeed quite contradictory; and it must be evident that the child can only come to know and feel them to be the same by learning to use its eyes; that is, by acquiring the habit of so directing them as to perceive one image, instead of the

two, which they naturally present. Then, it can go on to identify the single object thus perceived by sight, with the single object which it also perceives by touch. That is the beginning of its knowledge. Till then, it cannot properly be said to know at all. And especially we may note this, that the identification of the impressions of sight and touch, on the part of the child, is the essential condition for its speaking. It cannot talk, nor even begin to talk, till it has done this. Till then, it can have no clear perception of the objects to which names are applied. But when once it has united these two senses, and perceived that they relate to the same things, it feels itself surrounded by distinct objects, and talking follows, as a mere matter of memory and imitation.

This, I conceive, must be one phase, and a very important one, of the mental history of infancy. The child has to learn to do two things. First, to use its eyes, so as to receive from them a single instead of a double impression, and next, to recognise that the same objects give it its impressions of sight and of touch. I do not say, however, that this is the order which its thoughts take. Probably, it is the opposite; and the child first discovers that the sight-world and the touch-world are the same, and then finds out that it sees double.

This I think probable in respect to the child, because it seems to me to be true of man. For the bearing of this illustration, derived from the child's experience, upon the larger question of man's relation to the universe, is evident. We feel ourselves to be living in two worlds: a world of sense and a world of spirit; a world that we can grasp by the intellect, and another world of which we become conscious by other and deeper powers. Is not our case like that of the infant? It is unquestionable that man has these two classes of faculties; it is

evident th , until he has learnt to use and subordinate
them righ , they must give him the impression of two
worlds. T e supposition, then, that the worlds are truly
one, percei d by different powers, answers to the demands
of the cas Even if no direct evidence, no proof, could
be given uld have claim to be
received as simple, and supported
by an actu lfil that law of thought
which dem ssible number of causes
be suppos give the preference to
an idea wh ve place in the creation,
over one th ence. One world, with
two faculties xperience; therefore it
ought to be

For no weight whatever attaches to the difference which, we feel, exists between the objects of our sensuous and our spiritual apprehension. The appearance must differ—it ought to differ—from the substance. Two faculties, given as means of knowledge, were merely wasted, if that which they present to our consciousness did not widely differ. If touch and sight gave us identical impressions, what were we the wiser for having both? It is evident that we know the physical world so much more perfectly through having both eyes, and hands, than we could by either alone, simply because these respective senses perceive in manners so excessively unlike; that is, because the objects which we *seem* to perceive by each are as distinct from each other as things can be.

Nor can we lay down any limit beyond which the difference between an object and the appearance of it to certain faculties of ours may not extend. Evidently we are not in a position to do this. It would imply a knowledge much beyond our present attainments, to say in

what way existence might or might not "appear" to us, even if we had a very just idea both of it and of ourselves. We can at once convince ourselves of this by reflecting on the much smaller case of our various senses. Could we have foretold, or can we now explain, the characters which our apprehensions of things by sight, by hearing, by taste, assume? These things are as yet entire mysteries to us. Indeed, so far as we are able to judge, an object might affect us, through different faculties, in any variety of different ways. And if hardly any characters can be found common to spiritual and physical things, neither can any common character be traced between the colour that the eye perceives, the hardness felt by the hand, and the tone appreciated by the ear. Differences in the things perceived by different faculties, vouch for a distinction between the faculties, not for diversity of object.

We shall not be disposed, then, to argue from the seeming unlikelihood that the spiritual world could be presented to our faculties under the form of the physical, that it is not so in fact. That would indeed be "exceeding the limit of our powers." And, perhaps, our tendency to take this position may be adduced as a striking instance of the law referred to in my last letter—that ignorance produces a false confidence. And then, if we look at the case, apart from this natural yet inadmissible presumption in favour of our first impressions, there are many reasons which commend the view I have suggested. And, first, I would refer to an argument which the illustration of the child's experience directly brings before our thoughts; and that is, that the one world we might thus believe in would be incomparably *more* than the two we naturally suppose, through our twofold feeling. At first sight it seems, indeed, as if the contrary of this were true,

and that t conceive one world rather than two would be
to make ex stence so much *less*. But, in fact, the ONE we
might thu believe in, and gradually, by the conjoined
and mutua ly subservient use of all our faculties, learn to
know, wo l utterly outweigh, in magnitude and glory, the
two which answer to our impressions. If we do truly
believe th inadequate, we may
easily feel . And the analogy of
sight and ably before our minds.
For which t and most glorious—
the one p h both these faculties
spend the usted, leaving it un-
fathomed s ch should truly *be* such
as touch and s lf, respectively suggest?
Evidently the two faculties, conjoined in apprehension and exploration of one object, give results unutterably exceeding anything that their dissevered operation could attain. In a word, the appearances with which sight is conversant rise almost infinitely in value, when interpreted according to the dicta of the deeper faculty of touch, and made to teach us of the same things. In the nature of the case it must be so. And it must just as much be so, in reference to the intellectual, or sensuous, and the spiritual, apprehension of existence. Whatever value the former might have in and for itself, whatever excellence or beauty a world answering to its perceptions might possess, it could be (compared with what it might reveal if used as servant to the spiritual powers of man) but as the spangled veil of night, in the soft radiance of which the eye delights, is to the immeasurable universe of worlds, which—educated, interpreted, and used as servant—it makes us know. Yes; that immeasurable universe of worlds itself, to have revealed which is the proudest intellectual achievement of the race, is, to that

true universe which man may know, and glory and rejoice in, but as the spangled veil of night to that unutterable magnificence.

It must be so. If it demands *that* universe to be, to our eye, that studded vault, *what* universe must it demand to be, to our sense and to our thought, this world of life and beauty, and those other mighty worlds, silent, yet full of voices, hiding, yet therein more impressively revealing, the treasures of creative power?

What universe? Imagination faints and staggers at the thought, and cannot answer. What can be vaster than the infinitude of space, more than the countless orbs of heaven, more real than the solid earth, higher, lovelier, more perfect than this organic frame, bounding with life? What universe should eclipse this utterly, and show it but a pictured vision, narrowed to the sweep of mortal thought?

Imagination cannot answer. Nor need it. Happily the question is not one for imagination, but for learning. Not proud assurance, nor hasty speculation, but humble willingness to be taught, and patient interpretation of the facts, will avail us here. The field is open. By self abandoning study of all that God presents to us, bending and uniting to one end all our faculties, we shall learn what God's world is.

We *shall* learn what God's world is. It cannot be too bold to say it. For see, He has given proof to us that He means us to do so. He has given us the means. By giving us *two* faculties to apprehend it, two modes of studying and investigating it. He has fulfilled the conditions for giving us knowledge; He has revealed His will that we should know. It remains for us to do our part, and use our powers. But on this point I must take another opportunity to speak. As also of the

proofs, which seem to be furnished both by present
and the history of the past, that the comparison I
sought to exhibit is a just one. I may remark one
in conclusion, for the present. See how sight is gl
magnified, ennobled, in being made the minister
astronomical knowledge. What a noble task is
mitted to it, what splendid achievements it accomp
in leading our thoughts through all that infinite
in which it expatiates, and which, indeed, it alo
reach. Sight is honoured and made glorious, it r
its worthy place and performs its true office, *thus*.
how did it attain this noble function, and reach its
ful destiny?

By being mistrusted; by being recognised as
false impressions, and misleading, and needing to
cated, used subordinately, and interpreted. That
sight attained its true office, and asserted its real
and value. May it not be that the intellect must
its true dignity and use in the same way?

There is also a moral lesson here. He that hu
himself shall be exalted, is no arbitrary decree.
secret pulses of universal nature vibrate to th
And, indeed, this is one proof that material obj
exhibitions to us of holiest things. Spiritual fact
in them, spiritual light shines through them all, a
not be concealed.

XII.

THE TWO SIDES OF A THING.

(*October* 1862.)

NOTHING is more characteristic of man's advance in the knowledge of the world around him, than the perpetually recurring demand he meets with to give up his own imaginations, and accept simpler and larger thoughts. Nor indeed could this be otherwise. Since in all our investigations we are really measuring omnipotence by the forms of our own minds, a continual approximation to the truth is all that we can hope for. Nor could that approximation come in any other way than as a perpetual discovery that the powers and causes of which we seem to trace the operation, are in truth only the semblances under which larger agencies—of wider sweep and simpler character—have been partially discerned by us. Thus the study of natural Science possesses a double value, and teaches a twofold lesson. The beauty and order of Nature, as it reveals itself more and more widely before our minds, and puts to shame as manifestly inadequate the suppositions by which we have sought to explain it, teaches us lessons about ourselves which we should never, and never can, forget. As we feel how prone we are to mistake, to think what is too small, to erect figments, and hedge ourselves about with limitations, and

how, in o[r] to let the true light even of nature shine into us w[e] have to expand our minds, to free ourselves from shackles, and above all to cast out self from our thought, we [f]eel also what a moral expansion and deliverance must [b]e necessary for us, must be in store for us, before we [a]re fitted to see God. If the knowledge of the creature [m]ust grow so much larger, what must [t]he Creator do?

The im[m]ense facts which Science accumulates, [a]nticipated results which it meets at [e]very series it makes of innumerable [n]ew worlds within worlds in every ob[j]ect it explores; all these seem as if [t]o overwhelm the mind, and leave it utterly lost amid the mazes of its own wealth. And they would assuredly have this effect, if there were not another process continually going on in Science, at the same time with this multiplication of its materials and extension of its view. This process is the simplification of the ideas around which these ever multiplying facts are grouped, and with their simplification the diminution also of their number. So constant and indeed inevitable is this process, that it is no exaggeration to say that when any branch of Science has attained a certain perfection, the more facts and details it contains the easier it will be to understand. And we outsiders, who look on the process of Science with mingled admiration at its advance, and alarm lest no human mind should prove capacious enough long to grasp a single one of its divisions, may take heart. We shall not be left so utterly behind as we may fear. Our hope lies in the discovery of principles; in that reformation, which is sure sooner or later to come in every growing science, of its radical organisation. When that comes, then comes

the turn of the uninitiated world. The multiplied and almost unmeaning series of phenomena receive expression in a law which most probably is self-evident, or at any rate is capable of being easily apprehended. Then we, who seemed to be left hopelessly behind, and condemned to gaze, in the wonder not of knowledge but of ignorance, at a few striking experiments—at bright sparks, pretty colours, or graceful forms—have our opportunity. We take a short cut, and come up with those more strenuous or hardy travellers who have made a long circuit by the road. It is true we have not seen the prospect, nor experienced the invigorating influence of the walk. But still we enjoy the company and appreciate the view.

We see for instance how easy the system of the heavens became when it was found that the idea of the earth being in the centre was not large enough for it. How magnificent it rises up, and yet how simple! Every child can understand it, and yet no man however wise—however foolish—has been heard to say that he could have given counsel to its Maker. It is the same with the law of gravity, the same with the pressure of the air, with the circulation of the blood. All truths of this class, when discovered, put to flight a host of difficult and tedious speculations, and add to the common heritage of men what had been the questionable possession of a few. It is like bringing the wild forests of the far west under the plough. The pioneer toils amid savage wastes, but the bright homes of Europe rejoice in the plenty which his labours bring.

A revolution of this kind is taking place now, in relation to a new class of ideas which extended observation is forcing on our scientific men. In respect to everything with which they deal their old notions are

found to be too small, and a view as much more simple as it is more grand, is coming into their place. We know how the electric spark, the lightning, the shock, the attraction of the rubbed sealing-wax, and so on, used to be referred to *electricity;* the attraction of the magnet to *magnetism*, and expansion to *caloric;* [illegible] animals to the *vital force;* and [illegible] things. There were in short as many [illegible] to carry on the work of nature, as [illegible] and goddesses in their Olympus. [illegible] only almost as hard to understand, [illegible] latter, especially as no account could [illegible] they came, or why or where they disappeared. [illegible] increased knowledge has happily proved all such ideas as these too small. Man's heart has grasped a sublimer thought. There is no electricity, no heat, no vital force, no magnetism, no chemical affinity; none of all these mysterious and unaccountable things. These are but the appearances of something that is much more than they. What, then, is there? There is a Power (the action may we not say of an Agent unperceived)—a power which appears to us as a force present everywhere in nature: felt to a slight measure in our own limbs, when we strike, or lift, or resist a force applied, but equally at work in every corner of the earth; in plant, or rock, or stream; in planet and in sun, and orbs innumerable of the milky way:—revealed to us in the flood of the noonday light, but equally bespoken by the glimmerings of the remotest star. There is a Power, ever present, ever ruling, neglecting not the least, not quailing before the greatest; ruling-like law, as Hooker says,—"the lowest not excluded from its care, nor the highest exempted from its dominion;"—a Power that presents itself to us as a

force, one force in nature, thrilling to its deepest heart, and flowing forth responsive to every call. A Power which does all things, and assumes all forms, which has been called electricity in the lightning, heat in the fire, magnetism in the iron bar, light in the taper, affinity in the element, motion in the planet or the driven ball, but in reality is ever one. It operates according to the conditions which are present, but it is one Power, and it is never either more or less.

Is it not a grand idea; and as simple as it is grand? Are we not glad to lose our old acquaintances (if we can call them even so much as that) of electricity, and so on, and welcome this familiar friend?

And, further, from this new conception there arises a great principle to guide our thoughts. Every action which takes place in nature is like a quarrel, and has two sides to it; two sides also which are opposites, but not for that reason inharmonious. No change whatever that takes place in nature can be single; each is necessarily double, and consists of two distinct changes, of which the one is the exact counterpart of the other. It is evident that this must be so. If there be one force operative in all actions, then it can produce an effect in one place only through ceasing to produce an effect somewhere else. The case is exactly like that of removing a weight from one scale and putting it into another. If the latter is made heavier, the former is just as much the lighter. And if the one goes down, the other as certainly goes up. In all nature there is no *down* without an equal *up*, nor up without a down.

Of course, if this be so, a great part of the art of understanding natural events will consist in ever bearing in mind this law, and in looking out, whenever one action is seen, for its corresponding opposite; which is in truth

less a dif rent action (however different it may look) than an e sential portion of the same. We must in a word see tl.at everything has two sides.

The law is well shown in every case of vibration, as that of th pendulum of a clock, where a motion downward is f lowed by an equal motion upward; allowing for friction the air. This friction and resista notion, but in doing so give one of f the oneness of all the force in na m to 'stop' the motion by turning he friction turns it into heat, the re o atmospheric currents. As the air mo rows warm, the motion stops; the force a lace only as it ceases in the other. But the best possible exhibition of the two sides which every natural action has, is given by a pair of scales—however ordinary or to whatever common purpose applied. No ignoble use can rob the balance of the glory of displaying in its most telling form one of the wildest, deepest, most fruitful, and in some aspects last-discovered laws of science. He who studies well the balance, and seeing the opposite and equal actions there displayed, looks at all nature with the light of that fact in his eyes, and persists in spite of all appearance to the contrary, that it exhibits an universal truth, has the key to innumerable secrets.

XIII.

THE POSITIVE PHILOSOPHY: MR. HERBERT SPENCER.[1]

(*May* 1863.)

It appears to us that there is now taking place in the world a revolution almost as great, as happy, and as little apprehended by many of the actors in it, as that which in the early ages of the Roman Empire transferred the faith of mankind from heathenism to Christianity. Great movements are not easily appreciated by those who live during their occurrence. Their range and issue are beyond the sphere which the horizon of any single generation embraces, and the time they demand for their fulfilment outspans too far the life of the individual, to allow him often to form more than a vague surmise of their tendencies. It is probably owing in part to these causes that history reveals to us the curious fact that the ages in which the greatest transformations have been wrought, and the greatest advances achieved, have often been characterised by an emphatic disbelief in such transformations, and even by a noisily affirmed assurance of their impossibility. It may be that the first effect upon the minds of most men, of the suggestion of any

[1] First Principles. By Herbert Spencer, Author of "Social Statics," &c. London: Williams and Norgate, 1862.

considerab change, of whatever kind, is to produce a conscious epudiation of it as chimerical; or, it may be, that the negative and merely destructive side of any great mov ment is so obtrusive and threatening, while the first b ginnings of the new life are apt to be so hidden ar apparently unimportant—not to say that they may quarters from which human pr isly turn away—or it may be fr combined with others; but it seen nature that the periods of specially change are ushered in rather by a expectant state of the general mi e some vague condition of expectan lency in respect to the kind of result which is really being brought about. Who, for example, at the time when faith in Christ was beginning to leaven the heathen community—who, living in that community, expected, or could expect, a moral regeneration of belief or life? The whole tendencies of the age to the eye of the heathen moralist appeared, and must have appeared, the opposite. The civilised world, to his view, seemed given up to gross vices, or a fanaticism not less gross. Or at the time immediately preceding the Reformation, who could have foreseen that great uprising of the mind and heart of man against immorality and superstition! Ever the true prophet amid a degenerate age, thinks "I alone am left."

Or looking at the apparent tendencies of the human mind in the present age, noting the disposition there is to question everything that does not appeal to the senses, and to materialise everything that does; the proposed exclusion of all that is spiritual from the sphere of man's knowledge or concern, and the reduction of all his interest within the domain of the laws of

phenomena; who could suppose that even now the vastest change in the opposite direction is not only preparing, but actually taking place—that man's thought is becoming Christian! Yet we think we can make it evident that it is really so; and this by the help of a book that to many might seem the embodiment of the most anti-christian tendencies of the age.

Mr. Herbert Spencer, whose "First Principles" has recently challenged the attention of the philosophical world, has been for some time known as a leading representative, in England, of that school of thought which takes as its foundation the doctrine that our knowledge is necessarily only phenomenal. Perhaps, however, we should rather say he is a leading representative of one of these schools; for among those writers who accept this doctrine as an unquestionable maxim, more than one general tendency of thought may be discovered. On the one hand, there is the class of whose views Mr. Mansel is now the most prominent exponent, who, affirming the phenomenalness of our knowledge, yet insist, in the interests of religion, on certain limits to the consequences which may seem to flow from it. These writers argue that though our thought cannot apprehend the absolute, yet that we are capable of forming ideas which are *practically* correct of objects which are in themselves beyond thought, and that in the Christian Scriptures we have a "regulative revelation." On the other hand, Mr. Spencer represents a class of thinkers who manifestly regard this representation as a quite inadmissible compromise, and as involving a mean surrender of the claims of the intellect. "If," they may be regarded as saying, "our apprehensions are but phenomenal, then it is in vain to affirm for them, on any pretext, an opposite character. In respect to the true nature of

all things e are simply ignorant, and must assume contentedly th position of ignorance; which position, moreover, is one by no means so unsatisfactory as might have been supp sed." Here, however, this class of thinkers themselves divide into two classes; one of which holds that this nishing of all reference to any be the other affirms that this idea knowledge involves an essentially ; namely, the constant recognition events to, and their dependence u t absolutely inscrutable power. Th onours by his adhesion.

Thus, th forms of opinion which have in common the doct the phenomenalness of our knowledge. As representative men may be taken, respectively, Mr. Mansel, Mr. Spencer, and Comte. The first affirms positive religious doctrines; the second asserts a religion which cannot be formulated in doctrines; the third allows no religion, or at least none but a regard to Humanity.

But before we can enter further upon these details, it is necessary that we should endeavour clearly to ascertain what is meant by the doctrine that we know only phenomena, and recall briefly the grounds on which it rests. These grounds are set forth at great length (and with great completeness up to a certain point) by Mr. Spencer: but without following him in detail, we may shortly sum up the argument.

When men first begin to think, nothing seems to them more evident than that they have a very satisfactory knowledge of things around them. Our senses seem to convey to us very complete information of this kind; they give us the strongest natural persuasion that they do; nor can anything be more completely out of the line of our

expectations than the discovery that the case is not so. Yet a very little experience suffices to break through this natural persuasion, and to convince men that what the senses present to them is *appearance*, and that a different kind of knowledge is necessary. The obvious illusions of the senses speedily produce more or less of this feeling in any reflecting mind.

When this conviction is thoroughly produced, science begins to be possible. For science characteristically consists in a recognition of the incomplete, and therefore illusory, character of the impressions given by sense, and in the rectifying and completing them by combining the operations of the senses with a controlling action of the intellect. By this means the deficiencies of sense are supplied, or at least are put in the way of being supplied; and instead of ideas based upon and corresponding to our partial and isolated impressions, an idea embracing the total facts of the case, of which the intellect compels the senses to give evidence, is substituted:—truth for error. Thus science consists radically and most essentially in recognising the unseen. Its motto might well be expressed in the words of the Apostle, "as seeing that which is invisible." It introduces, as elements of our knowledge, things which are not directly within our perception.

And this result accrues through a change in the method of the mental procedure. Instead of bringing the intellect, or rational power, into play only *after* the operation of the senses—instead of first receiving from sense our fundamental beliefs, and then bringing our reasoning faculties to bear, and erecting ideas on that foundation—we introduce a new order and method into the use of our powers. The intellect, in science, is used not after, or as supplementing sense, but both powers are

used toge r; and the deliverances of sense are made to
complete d check themselves under the guidance of
the reason. In other words, in the creation of science
the essent l point is the different position and mode
of use ass ned to the intellect. Instead of being used
secondarily as we naturally tend to do, it is placed in a
position of t is used as a guide to
direct, as a n to check and correct
the senses.

These t us used together, give
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this is evid ure of sense as being
limited and partial in its perceptions. These perceptions need to have their partialness completed, if they are to guide us right. Yet they give us in themselves no indication of this necessity; they do not betray their own shortcomings, and it is wholly out of their power to suggest to us that which is beyond the bounds of their perception. The remedy is that the intellect, which apprehends in a different way from the senses, and is capable therefore of presenting to us that which they cannot grasp, should be united with them in their action, should interfere to check them at every point, and guide us throughout in the interpretation we put upon the impressions we receive from them.

The effect of thus using the intellect to guide and correct the senses is that which we see in science; a truthful in place of a deceptive apprehension of natural events, their order and conditions. It is that on which the moderns so largely pride and congratulate themselves, their command and use of nature through knowledge of her laws; the value of which, though it may be exag-

gerated, is not to be lightly estimated. It is very much, though it is not all that men are prone to think it.

For after a time it is discovered that even in making this advance our essential condition of ignorance is not altered. The knowledge which science gives us does not go to the point which men aim at, and which they fancy they are attaining by its means. The question we ask is, "What?" and the answer we receive from science is only —"In this order." It does not tell us that which we sought to know, which is the very nature of the things that are around us, and with which we have to do. On this point science is silent, even when most it seems to speak. What it tells us is simply that successive events transpire in a certain sequence, and that all changes conform to an ascertainable order. By that information, which is eminently practical, and gives us the power, within certain limits, alike of predicating the future, and effecting our own desires, it is natural enough that men's minds should be, for a time at least, contented, and diverted from the other and natural inquiry, "What *are* the things?"

For a time they are so diverted; but not permanently. For when the sequences which science traces begin to present some appearance of completeness the question again arises, "What is the essence of all these things?" and presses for a distinct answer. Thus, to take an instance from chemistry—which perhaps of all the sciences most seems as if it would reveal more than the order of change in nature, and might show us what its essence is: —when the chemist has analysed all compounds into a certain number of elements, and found that these combine or decompose under certain fixed conditions, he can hardly help feeling that he is no nearer knowing what things *are* than he was when he started. His oxygen

and hydro n, and carbon and sulphur, and metals occupy in respect) his knowledge precisely the same position that the compounds he has analysed into these bodies previously ield. He knows of the nature of the one class of b ies just as much and just as little as he previously kn w of the nature of the other. He has not advanced a he course he has been pursuing nce. Suppose he were to succeed ments to one, that one would still are now. It would be an unknow they are. He would have learnt ucing the many to the one, or of e he many; but the one would still nquiry that the many did. He would ask, "What is it?" as he before asked, "What are they?" and would feel the problem only the more difficult, because in solving it he must account for all the qualities of the derivatives.

It is the same with whatever branch of science we take up. When we have traced all the sequences, we still stand before the question, inevitable to a reasonable creature, "What is the thing?" or, "What is the power?" Say we take the functions of the living body; suppose our knowledge of them had become perfect, then we ask, "What are the substances which compose the body; what is this life which dwells in it?"

Now, it is from the asking of this class of questions, after all the properly scientific methods have been employed, that the modern doctrine that "we know only phenomena" has arisen. For the attempt to answer questions of this kind has proved a manifest failure. Try to conceive the objects of our experience as we may, it is found that no conception will stand a rigorous testing. We cannot present to our minds any idea of the ultimate

essence of any thing, or of any power, in nature, which does not prove itself illusory when we enquire whether it can really be the truth. On this point Mr. Herbert Spencer expends a great part of his efforts in the volume before us; undertaking to show at length that every notion men have succeeded in forming of the ultimate essence of things involves contradictions, or some other form of unreason. In this way he goes through the ideas of time, space, matter, and force, and endeavours to show, partly by old and partly by new arguments, that our seeming knowledge in respect to each of these is real ignorance. As a specimen of his argument on this point, we may extract his remarks respecting *matter*. The passage is somewhat lengthy, but it is interesting in itself, if only as showing what kind of questions are engaging the thoughts of those philosophers who busy themselves with physics; and it is only by presenting it completely that we can enable our readers to judge of its validity.

"Were it not for the necessities of the argument it would be inexcusable to occupy the reader's attention with the threadbare and yet unended controversy respecting the divisibility of matter. Matter is either infinitely divisible or it is not: no third possibility can be named. Which of the alternatives shall we accept? If we say that matter is infinitely divisible we commit ourselves to a supposition not realizable in thought. We can bisect and re-bisect a body, and continually repeating the act until we reduce its parts to a size no longer physically divisible, may then mentally continue the process without limit. To do this, however, is not really to conceive the infinite divisibility of matter, but to form a symbolic conception incapable of expansion into a real one, and not admitting of other verification. Really to conceive the infinite divisibility of matter, is mentally to follow out the

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"Again, leaving this insoluble question, let us ask whether substance has in reality anything like that extended solidity which it presents to our consciousness. The portion of space occupied by a piece of metal seems to eyes and fingers perfectly filled; we perceive a homogeneous, resisting mass without any breach of continuity. Shall we then say that matter is as solid as it appears? Shall we say that, whether it consists of an infinitely divisible element or of ultimate units incapable of further division, its parts are in actual contact? To assert as much entangles us in insuperable difficulties. Were matter thus absolutely solid it would be, what it is not, absolutely incompressible; since compressibility, implying the nearer approach of constituent parts, is not thinkable unless there is unoccupied space between the parts. Nor is this all. It is an established mechanical truth, that if a body moving at a given velocity, strikes an equal body at rest in such wise that the two move on together, their joint velocity will be but half that of the striking body. Now, it is a law of which the negation is inconceivable that in passing from any one degree of magnitude to any other, all intermediate degrees must be passed through; or, in the case before us, a body moving at velocity four, cannot by collision be reduced to velocity two

without passing through all the velocities between four and two. But were matter truly solid—were its units absolutely incompressible and in absolute contact—this 'law of continuity,' as it is called, would be broken in every case of collision. For when, of two such units, one moving at velocity four strikes another at rest, the striking unit must have its velocity four instantaneously reduced to velocity two; must pass from velocity four to velocity two without any lapse of time, and without passing through intermediate velocities; must be moving with velocities four and two at the same instant, which is impossible.

"The supposition that matter is absolutely solid being untenable, there presents itself the Newtonian supposition that it consists of solid atoms not in contact, but acting on each other by attractive and repulsive forces, varying with the distances. To assume this, however, merely shifts the difficulty: the problem is simply transferred from the aggregate masses of matter to these hypothetical atoms. For granting that matter, as we perceive it, is made up of such dense extended units surrounded by atmospheres of force, the question still arises, What is the constitution of these units? We have no alternative but to regard each of them as a small piece of matter. Looked at through a mental microscope, each becomes a mass of substance such as we have just been contemplating. Exactly the same inquiries may be made respecting the parts of which each atom consists; while exactly the same difficulties stand in the way of every answer. And manifestly, even were the hypothetical atoms assumed to consist of still minuter ones, the difficulty would reappear at the next step; nor could it be got rid of even by an infinite series of such assumptions.

"Boscovich's conception still remains to us. Seeing that matter could not, as Leibnitz suggested, be composed of unextended monads (since the juxtaposition of an infinity of points having no extension, could not produce that extension which matter possesses); and perceiving objections to the views entertained by Newton, Boscovich proposed an intermediate theory, uniting, as he considered, the advantages of

both, and avoiding their difficulties. His theory is, that the constituents of matter are centres of force—points without dimensions, which attract and repel each other in such wise as to be kept at specific distances apart. And he argues, mathematically, that the forces possessed by such centres might so vary with the distances, that under given conditions the centres would remain in stable equilibrium with definite interspaces. This speculation, however, ingeniously as it is elaborated, and eluding though it does various difficulties, posits a proposition which cannot by any effort be represented in thought: it escapes all the inconceivabilities above indicated by merging them in the one inconceivability with which it sets out. A centre of force absolutely without extension is unthinkable: answering to these words we can form nothing more than a symbolic conception of the illegitimate order. The idea of resistance cannot be separated in thought from the idea of an extended body which offers resistance. To suppose that central forces can reside in points not infinitesimally small but occupying no space whatever—points having position only, with nothing to unite their position—points in no respect distinguishable from the surrounding points that are not centres of force;—to suppose this is utterly beyond human power.

"Here it may possibly be said that though all hypotheses respecting the constitution of matter commit us to inconceivable conclusions when logically developed, yet we have reason to think that one of them corresponds to the fact. Though the conception of matter as consisting of dense indivisible units is symbolic and incapable of being completely thought out, it may yet be supposed to find indirect verification in the truths of chemistry. These, it is argued, necessitate the belief that matter consists of particles of specific weights, and therefore of specific sizes. The general law of definite proportion seems impossible on any other condition than the existence of ultimate atoms; and though the combining weights of the respective elements are termed by chemists their 'equivalents,' for the purpose of avoiding a questionable assumption, we are

unable to think of the combination of such definite weights, without supposing it to take place within definite numbers of definite particles. And thus it would appear that the Newtonian view is at any rate preferable to that of Boscovich. A disciple of Boscovich, however, may reply that his master's theory is involved in that of Newton, and indeed cannot be escaped. 'What,' he may ask, 'is it that holds together the particles of these ultimate atoms?' 'A cohesive force,' his opponent must answer. 'And what,' he may continue, 'is it holds together the parts of any fragments into which by sufficient force an ultimate atom might be broken?' Again the answer must be, 'A cohesive force.' 'And what,' he may still ask, 'if the ultimate atom were, as we can imagine it to be, reduced into parts as small in proportion to it, as it is in proportion to a tangible mass of matter, what must give each part the ability to sustain itself and to occupy space?' Still there is no answer but 'A cohesive force.' Carry the process in thought as far as we may, until the extension of the parts is less than can be imagined, we still cannot escape the admission of forces by which the extension is upheld; and we can find no limit until we arrive at the conception of centres of force without any extension.

"Matter, then, in its ultimate nature, is as absolutely incomprehensible as space and time. Frame what suppositions we may, we find on tracing out their implications that they leave us nothing but a choice between opposite absurdities."

The reader who is familiar with the history of metaphysics will perceive that these arguments are altogether different from the celebrated ones by which Berkeley endeavoured to overthrow the existence of matter, and that they are urged with a different aim. Berkeley sought, by insisting on the apparent qualities of things—the *whiteness* of paper, for example—to prove that they demand a mind in which to exist, inasmuch as these qualities (such as *whiteness*) could not be except where

there was consciousness. Thus his argument against *matter* is c[illegible] a positive kind, and has for its end the affirmation [illegible]of a definite doctrine: that mind, or spirit as he terms it is the only existence. But Mr. Spencer lays hold of a d[illegible]fferent class of ideas, a class to which science especially c[illegible]nducts. and seeks to establish by their means, not a posi[illegible]ondition of permanent doubt. Ac[illegible]ply cannot affirm—we are not ju[illegible]ving—anything about the reality [illegible]recognise that "in its ultimate es[illegible]nown."

For if t[illegible]he things presented to our senses, r[illegible]other existences which are the obje[illegible]encer points out, herein using chiefly the same arguments as Hamilton and Mansel, how unable we are to conceive the Absolute and the Infinite. So that we come, under his guidance, to this result—that in respect to both the ultimate religious and the ultimate scientific ideas, we cannot attain true conceptions. Or, in other words, in respect to all subjects whatsoever, what we can conceive cannot *be*. We may express the idea briefly by an extension of a celebrated saying of Sir W. Hamilton's. As "a God that can be thought is no God," so a substance that can be thought is no substance. In other words—for it is worth while to look at the position in every point of view that we may thoroughly understand what it means, since it is full of the most important practical consequences—we must not attach the idea of *existence* to anything that we can conceive.

Doubtless this is a considerable demand to make of us; but, if reason be shown, it is not a difficult one. It is perfectly possible, nay, easy, to separate the two thing—our best notions of things, and our idea of existing—

although we have been accustomed to unite them; and to think of that which we have supposed, or can suppose, to be the true and real nature of things, as being only what they are to our faculties, or what they seem to us. Perhaps the easiest way of doing this, as it certainly seems to us to be one of the clearest and most truthful ways, is to avail ourselves of the analogy of the eye, and to accustom ourselves to regard our intellect (or whatever we may term that power by which we form thoughts or ideas of things) as being like the sight. It gives us a consciousness of that which is around us, we perceive by its means; but it presents to us, *consciously*, not existence as it is, but only its—phenomena.

Thus we come to the very proposition of which we have been endeavouring to trace the meaning. It is easy to see why it is said, and what is meant when it is said, that we know only phenomena. It is just the same, in its way, as that which is meant when it is said that we "see" only "appearances." *Phenomena* are the appearances to the intellect. And we have to remember respecting them that, strictly speaking, they ARE NOT; just as we remember familiarly enough and easily enough that "appearances" *are not* to our touch.

But of course, if we detach our idea or belief of *existence* from the phenomena, we do not thereby in any respect give up or embarrass *our belief in existence*. It is just the same as it is in respect to appearances to sight; though we do not believe in them as being solid objects, we believe in solid objects which we perceive in and through those appearances. So with respect to all phenomena and all the ideas we can form of things; though we do not believe in them as existing, we believe in some existence which we perceive in and through them. Matter and motion, for example, cannot be existing, they

are but [illegible]enomena; but in this way—as matter and motion—[illegible]e perceive that which *is* existing.

We hav[illegible]e said this is not difficult: nor is it so in one aspect of [illegible]he case; that is, considered as a mere intellectual prop[illegible]ition. It is as easy to understand as that in the heave[illegible]s at night there is not a small bright crescent, but that [illegible]ceive the moon. Nor is it really [illegible]ay be rather dry and abstruse, t[illegible] the evidence on which the prop[illegible]l; we have given the reader the [illegible]this point in the extract we have [illegible]'s book. But there is a difficulty [illegible]rtheless, and a difficulty which must [illegible] immense, though it is greater to some persons than to others. This difficulty arises from the fact that the proposition contradicts—or perhaps we should rather say seems to contradict—the evidence of sense. It is certain that whether matter and motion truly exist or not, we feel them as existing. They are true existences to our experience, however phenomenal they may be demonstrated to be. Mr. Spencer himself recognises and refers to this fact, though apparently not discerning its full significance. He urges (p. 227) that our feeling in respect to the phenomenal is that of its being real or existing, just as much (he thinks) as if we were conscious of the truly existing or essential. And whether in this latter respect he be right or not, there is no doubt about the fact he states. The things which he and others have proved to be but phenomenal are felt by us as not being phenomenal at all, but as being most veritable existences. Is not this the case with matter and motion? which are two of the things which Mr. Spencer most elaborately demonstrates to be "only phenomenal," proving them impossible to be, as involving

utter contradictions? Are they not felt as existing by us? do they not practically exist to us? We all remember Dr. Johnson's argument against the idealist—mistaken though it was—a knock with his stick upon the ground. It is enough to prove, at any rate, that matter and motion are existences *to us*. But then, is our feeling of existence all awry? are we feeling that which is but phenomenal to be not phenomenal, but actual? If Mr. Spencer's arguments are true, unquestionably we are. This is his affirmation—clearly involved, though not expressly stated—and as it seems to us made good and proved. This, as we have said, is the reason the doctrine that we only know phenomena is difficult. It is so because this consequence is involved, a distinct repudiation of the apparent teaching of sense, or at least of the impression naturally produced by sense. We must, if we accept this position, learn again to feel in one way and to think in another.

We must learn *again* to do this, for in truth it is by no means the first time this demand has been made upon us, though the lesson has not yet become easy by practice. And it is most natural that this demand should be made upon us, in this larger sphere, emphatically through the teaching of science, for it is science which has ever been the agent in enforcing it upon us in other cases. What indeed is modern science but a continuous process, on man's part, of rising above the impressions which his senses produce, and learning to think otherwise than as he feels. One instance it will suffice to adduce, since others cannot fail to occur to the reader's mind. Do we not feel the powers we exercise, in using our bodily strength, to be our own, inherent in ourselves, original and underived, at least from things around us? But science teaches us to *think* of those powers as not our

own, as ing simply a part and mode of nature's force, temporarily stored up in our nerves and muscles. In almost ev ry case of scientific knowledge it is the same; that which we rightly know is opposed to that which we feel. Surely it must be so. Is it not evident when we recall how limited our feeling is? Though it is a difficulty then n re n to this doctrine of our knowing nome he sense in which it is affirmed) that it necessit thinking differently from our feeling. This stam ther with an air of truthfulness; gives it almost riori claim to be regarded as a rightful fruit of s Might we not even have expected, or at least hav for, some such correction of our too small impress. the universe?

The difficulty, therefore, which this doctrine presents, in demanding of us to give up the existence of that which we feel to exist, ought not to be, and indeed cannot be, permanent. It is a temporary obstacle till reflection has done its work, and no more. But the value, the religious value, of the doctrine is unutterable.

Mr. Spencer claims for his view that it is not only *a* religious position, but pre-eminently *the* religious position; and we are most thoroughly disposed to agree with him, though we think he does not appreciate the force of his own arguments, nor fully understand his own words. For let us now attempt to realise the meaning of this fact, of which Mr. Spencer and his compeers have put us in possession; let us endeavour to see whether its bearings really are favourable or adverse to religion.

They are put forward, indeed, avowedly as adverse to any other religion than a mere reverential acquiescence in ignorance concerning all that truly exists; but it appears to us that this supposed opposition to positive religion arises from the fact that the doctrine itself is so

profoundly, so intensely, so overwhelmingly religious, nay, so utterly and entirely CHRISTIAN, that its true meaning could not be seen for very glory. Like Moses when he came down from the Mount, this positive philosophy comes with a veil over its face that its too divine radiance may be hidden for a time. This is science, that has been conversing with God, and brings in her hand His law, written on tables of stone—that grow beneath our very gaze into the fleshly tables of a heart, the heart of His own Son.

The positive philosophy is philosophy laying itself at the feet of Christ; it is the emphatic testimony of man to the Gospel, the more emphatic because unconscious and undesigned. For when we consider what is implied in its statements, they assume a meaning which only some of the profoundest and most distinctive Christian doctrines can adequately express; while, at the same time, its very denials, setting aside the bondage of apparent truths and accepted notions, open the door freely to methods of thought in which religion finds its surest basis and its most perfect development. On the one hand, there is the fact asserted by this philosophy in the most unequivocal terms, that the things which we feel to be—those which are expressed by matter and motion and force, and time and space—*are* not; on the other, that our faculty of thinking presents to us only appearances. But this implies that our intellect is like the sight, and that we are feeling appearances to be existences: for sight is exactly defined as a perception of *appearances;* and the matter and motion, &c., which the intellect thus perceives, are felt by us to *be*. Now this latter fact—the falsity of our feeling—implies a false or depraved state of being; and the former—the scope of intellect being like that of sight—gives power and authority to the moral faculties

in us, to *use* it as we use our sight, and to interpret its indications into moral or spiritual terms. These two results flow directly from the doctrines of the positive philosophy—which is Mr. Spencer's.

And do we exaggerate at all in calling these results emphatically religious, emphatically Christian? Is not a depraved state of the very being of man the very turning-point of Christianity? Is it not on that fact that the whole system, the redemptive and restorative process, centres? What more or better, as a tribute to Christianity, could philosophy bring, than a demonstration from its own sphere, and expressed in its own terms—the more confirmatory for being different from those which are familiar to us—that man is in a perverted, a defective state?

And then, if we take the other element of philosophy which we have noticed, that the intellect holds in us the place of the sight, and gives us immediate knowledge, not of the truth of being, but only of its appearances, what more or better on behalf of piety could we ask from philosophy? Have we not other faculties by which to guide, correct, interpret it? Have we not moral emotions, souls, consciences, feelings of the divine, the right, the good? Can we not use the intellect subordinately to these, if only we know that we *may?* and does not this philosophy exactly inform us—you may do this? Nay, does it not tell us that unless we deliberately choose to be deceived, or to abstain altogether from the full exercise of our faculties, we must do so? It bids us make our thought wholly and in all its exercise religious; as before it has bidden us recognise in all our consciousness the proof of man's need of a deliverer!

But even this is not all. Mr. Spencer himself points out that if all that we are conscious of, or can conceive,

is *phenomenal*, then all that is in our experience, however it may appear, is truly due to the action of some Power unperceived, is the effecting of some hidden fact. We can go—aided by him and thankfully acknowledging his help—a step further still. All that we experience is the action of a Power whom we must know by the soul, and can recognise only in our conscience and our heart; it is the working out of some fact which the intellect cannot picture, but which faith must grasp, the religious emotions shape into its form. The positive philosophy makes all our life religious, and bids us seek from the highest sources within us—and, thank God, from the still higher ones without—the fact which constitutes it all. This negative foundation for a religious life, it lays broad and strong: our life is not what we feel it. It is not the vain struggle of a poor soul immersed in "matter and force," the victim of their passive laws, the sport of their blind impotence. There is another fact than this, that constitutes our life; and the intellect can present to us only its "phenomena."

We cannot now, through limit of space, pursue this aspect of the subject further, though it were not difficult to show how simple the idea of our perceiving *phenomenally*, under the forms of matter and force, really is, when it is examined without haste or prepossession. It might also be shown quite easily, it seems to us, how curiously and yet how naturally the exponents of the positive philosophy have come to think that they have arrived at an end, when in fact, by their own showing, they are instituting a beginning. Granted that they have proved that we cannot think matter and motion, &c., as *being*, it does not follow that we cannot ascertain how they come to be the phenomena to us. These two questions have been confounded; or rather the latter, which presses most invit-

ingly for study, has been overlooked. Our philosophers, many of them, eminently endowed as they are, and Mr. Spencer among the number, seem to have had their minds so filled with the negative results to which they had succeeded in pushing the old questions, that they had no eyes for the new ones which sprang up beneath their feet. Far be it from us, however, to think slightingly of them on this account. Each man does his part; and we all of us in this age, in our most successful work, do but enter upon the fruit of other men's labour.

Yet some of these new questions really are inviting. Thus, for example, in the very perception that anything that has been supposed to be an existence is but phenomenal, what a new sphere for inquiry is opened! How simple it is to ask, "Which of its qualities may be referred to the fact of its being phenomenal?" and, "In what respects may the phenomenal be known to differ from the actual?" It is impossible to say that these questions are not open to us till they have been tried. To us it seems that they yield results remarkable at once for their value, and the ease with which they are obtained. Is it not evident, to take only one instance, that that which is only phenomenal, and does not truly exist, cannot truly *act?* The quality of not acting, therefore, which, under the name of inertness, is held so distinctive of matter, may surely be recognised as one that belongs to the phenomenal. In a word, *inertia* marks phenomenalness, and has no other basis.

We might greatly multiply observations of this sort, but there are more reasons than one for resisting the temptation; of which not the least is that we would not divert the reader's mind from the religious to the speculative aspects of the subject. Rather we would ask him whether we were not justified in saying that the thought

of man is becoming Christian? that there is taking place, unconsciously and undesignedly, in our own age and nation, a change for good, of which the world has seldom seen the equal? And if so, is it not beautiful to live in such a time, and watch such a work?—and not only to watch, but to hail it and to take part in it: for all of us may do so. The task is not beyond the powers of any, little as they may be fitted for abstruse speculations, or much as they may mistrust their power of determining between rival philosophers. For it is not to the intellect only, or chiefly, that the appeal is made, but to the heart and to the conscience. Our intellectual giants clear the way for us, they cut down the rank growth of prejudice and error; but it is not for them to erect the temple in which the worship of the future shall be paid. This is a toil and an honour reserved for the sincere and humble souls who have preserved their spiritual vision clear, and kept unpolluted hearts. For them the mighty of this world of thought and speculation toil; from before their eyes they remove the veil; from their hands they strike off the chains; to their lips they give boldness. "Behold," they say to the meek and poor in spirit, "that which the heart affirms, not which the senses feel or intellect devises, that is true. Tell it to us, that we may hear and live."

To no age has God given a privilege more glorious than to ours, to none a task that less could excuse indifference. The gathering into unity of that which man has discovered with that which God has revealed, the ending of the fatal controversy between the intellect and the soul, the bringing of the whole humanity within us into a harmonious subjection to Christ, religion absorbing and making its own the reason, and the reason taking its place as the free servant of religion; this is the work in which we are engaged, the prospect to which we look.

The first in vitable step, that carries with it all the rest, is taken. 'he intellect has owned itself but a perceiver of appearan es; and doing so it calls on the higher faculties of man to assume their rightful place—tyrannised over and c shed so long—and guide and use it in their service. F en that science arises when the s d subjecting reason—place them , and do her bidding; even so is i ds the soul (as now it does) assum st succeed to darkness, harmony to present, but in a fairer order and w ruits that bless us, yet deceive us so .

Of the three forms of the doctrine that our knowledge is phenomenal — represented by Comte, Mansel, and Herbert Spencer respectively—it will be seen that the first, which ignores all that is superhuman, is inconsistent with itself; refusing to recognise what itself affirms—an existence inconceivable, with which we truly have to do. The second, which seeks to supplement its denial of the human power to know, by the device of a regulative revelation, telling us what it is good for us to believe, frustrates the very object at which it aims by the measures it takes to secure it. Ignoring the power of the moral nature, not to supersede or supplement, but to guide and use the intellectual, it foregoes the ordained development of the religious powers of man—which it distrusts or denies—in order to grasp at a fallacious refuge. It erects upon the sands a building which the floods inevitably sweep away, not seeing the rock on which the foundation is already laid. The third form, presented by our author, marching boldly forward, yet not closing its eyes to that which its own premisses imply, accepts the foundation, but neglects to build. Neglects to build, yet surely only for a time.

XIV.

ON TWO PENHOLDERS.

(1864, *Unpublished.*)

VERY likely the reader has seen a notable invention of our days—the "orthographic pen," designed to teach children how to place their fingers when they write. It is curious to think with what a strange, half-amused, half-melancholy interest we look upon all such aids in childhood's path, forgetful of our own. They are real instruments of torture, though they are trifles. Not one of them but has been wet with bitter tears, yet tears that laughter soon has chased. This orthographic pen, for instance, what a formidable unmanageable look it has. What despair it must strike into a poor child's heart. Its three projecting plates, ranged spiralwise around, must appear to his little soul the very sum of all mystery. He has before thought pothooks and hangers unutterably difficult and provoking, but now he feels that an insuperable obstacle has been placed in his path, and he renounces writing in despair. That pen he can never learn to hold. Nor, indeed, in this case is he so far wrong. If ever there was a device for making orthography an impossible achievement, this penholder might well claim to be it. Surely no mortal could write with it, least of all a child. The poor little hand would labour under its burden like a pigmy dressed in armour.

So appears to have thought a man whom we may call a real children's friend; with the happiest perception of juvenile requirements he has gone to the root of the matter and produced another "orthographic penholder." This man (he must be the father of a family) has solved the problem. [illegible] plates have disappeared; the bloated [illegible] ls the eye, nor over-burdens the [illegible] ll the object aimed at is attained. [illegible] e for the little fingers, the exact po[illegible] each. The mystery of penholders is solved: he [illegible] *way* certain portions of the metal and the thing [illegible] Thumb and fingers fit each into its own apertu[illegible] pen is simply so much the lighter. This is the right [illegible] ing, as clearly as the other was not.

Orthographic penholders are a small affair; the sorrows and triumphs of the school-room do not count for much in history, but in this little matter much is shown; two main principles in human life are exquisitely illustrated by it.

For example, in what a tangible form it exhibits the fact that negatives are practically positive things to us. The absence of the portions of metal are guides as real as the added plates. Though opposite in one sense, they are precisely equivalent. They are equally things, or existences to us, and are equally efficient to affect us.

And so it is in matters of greater moment. To remember that negatives are practical existences, influencing our feelings or producing manifest effects without us, is a great part of the art of understanding nature. And to forget it is one of the chief errors to which we are prone. For it always seems to us that everything has its positive and special cause; which cause of course stands before our mind as a distinct thing added to that

which would otherwise exist. And we see how often men have thus misapprehended nature; how many imaginary things or powers they have invented, and to what difficult and complicated notions they have been driven. The rise of fluids in a vacuum needs no special property in nature, when it is seen to depend upon an absence of the pressure of the air; nor does the tendency of light bodies to rise, when it is seen to follow from their comparative absence of weight.

There can, indeed, be little doubt that much of the obscurity in which natural phenomena are still enveloped depends upon a similar misapprehension. Things that are negatives in respect to the elements on which our thoughts are fixed, being practically positive agencies to us, pass muster in our minds as separate existences. And we needlessly invent such existences, when we should be recognising the leaving out, or absence, of that which is elsewhere present. To borrow a term from physiological science we imagine "cells" where perhaps we should see "vænoles."

Always when we can take this step nature becomes so much the simpler to our thought. There is one element the less to be remembered or supposed. A single element or power, with an absence of it, accounts for facts for which we had before needed to imagine two. And it is thus one of the chief means by which our grasp of natural events becomes more complete. Nor is there any fear lest by this process nature should become less to us, or her infinitude cease to provoke our wonder. So far from this there is nothing which more largely tends to raise our thoughts of nature and to add to the force and grandeur of the impression it produces upon us than this simplification of our apprehension, and reduction of the number of the means by which it seems to operate. In

many ways this result follows. It is not only that the more simple and unique impression we thus received rouses our emotions more powerfully, and causes the very same elements by concentration to produce a greater effect upon the mind; nor that every step in this direction facilitates our further advance, so that every seeming loss is soon ; but in fact, the very recognition of the root of any fact or process in an elevation of our thought. nature more; for it implies the power than that which is excluded. perate as a cause there must be pres... d more comprehensive force from which s seeming power. In the cases before adduced this is evident; the filling of a vacuum by fluid rests upon the universal pressure of the air; and can be ascribed to its true negative cause only by the recognition of that pressure. So the using of the lighter class of bodies rests upon the universal property of weight.

These two processes, indeed—the recognition of negative influences, and the discovery of wider-reaching and higher powers in nature than had been known before—must ever go on together. They are in truth two parts of one process; and for this reason, partly it is that science, which is essentially the discovery of nature's greatness, has for so constant an element in it the discovery of the effects of negatives. The latter process is the very condition of the revelation of the deep, the universal laws,—the knowledge of which is man's glory and delight. Without it our knowledge would not tend towards simplicity, would not become grander, more fascinating, more ennobling every year. It would tend to become a mere labyrinth of complex irrational details,

in which no necessity and no order could be traced. For the appearances which nature presents, exhibit a continual variety; apparently contradictory results constantly take place. It is the recognition of negatives, bringing opposite appearances under one law, that emphatically introduces order.

How much more of order and of light this simple process is destined to introduce into our thoughts we cannot foresee. It may be that some hitherto dark and barren regions in the mental world may be turned by it into bright and fruitful fields. But we cannot anticipate them here. The point we notice is, that be its effects, past or future, however great or wonderful, the entire principle is contained in the trivial instance of the second penholder.

But there is another point also in which some of the largest laws of human nature are illustrated by this little thing. If we consider for a moment, we perceive that it was quite impossible that the last of these penholders—the one with the portions of metal cut out—could have been invented first. Even without regard to the manifest superiority of the latter, their order could not have been inverted. The worse, if it came at all, must have come first. Nay, it could not but have come first, at least in thought. For the idea being to put something as a guide to the child's fingers, how could the first conception be other than that of putting some positive substantial thing? The addition of the solid plates must have had precedence in the mind to that of taking away. However soon it might have arisen, the latter notion must have been a second thought. And in this instance it did not suggest itself until the first conception had been realised, tried, and shown itself a palpable mistake. Probably it only suggested itself to another mind. But if it had

arisen imm diately upon the first, and had been the only one realise in practice, it would still have been equally the second thought.

In a w d, we see that here a false method, a plan essentially he wrong one, must by the nature of the case, by the ve ies, have preceded the right. Tw for rightly doing this little thing n accomplished by less: one of the at a result, the other achieving it her simple: one naturally, and i esting itself, the other manifestly

But this a The order of human progress is shown in it as truly, as completely—nay, with an eminent precision and distinctness—as in the greatest and most serious affairs. Man ever advances in this twofold course, and by a necessity inherent in his nature ever must do so. His first thought, his first attempt is ever an abortive one; at once complex and ineffective for its purpose. Especially it errs in introducing elements which are unnecessary, and which, while inevitable, yet baffle his own design. He finds the true only by perceiving where the "natural" goes astray.

I say, this is at once a law rooted in his nature, and a fact evident in his history. Plainly it must be the case in every instance which agrees with this of the penholder in being the recognition of a negative; whether as a cause in nature, or as a means to his own ends. In all these cases the same necessity of first conceiving some positive thing will be present. And in all other cases, too, there is an evident necessity that the law should hold good, and that man should arrive at truth not by a mere continuous progress but by two main steps; one of them a correction of the other. The necessity is evident in this,

that man starts with insufficient knowledge; starts indeed on each new inquiry essentially in ignorance, which cannot be removed except through theories and trials. "Starting from ignorance," it has been said, "error must have precedence of truth." And surely it is evident it must; nay, if it were not so, where were the benefit of knowledge? Facts cannot be accurately observed without a theory, or some supposition, by which to connect them and make them significant; but how is this supposition, which has been formed without a knowledge of the facts, to be a true one? It is even a contradiction to imagine it possible to be true. If the human mind have any laws, and obey any order, the conclusions it arrives at when the necessary data are present must be different from those which it arrives at when they are wanting. To say that man must first go wrong ere he goes right is merely to say that he must fulfil the inevitable conditions of acquiring knowledge.

And when we turn to experience and ask its verdict, is it a doubtful one? What is human progress but one long history of success obtained through failure, and truth at last triumphant after long conflict with established error? Do not our two penholders sum up the whole? Are they not history in miniature; the course and fathom of time compressed, as it were, into a needle's point?

Nor need we be reluctant to concede—for our honour or advantage sake—that such as this is the condition of our knowledge, the price of our success. The deeper we penetrate into nature the more plainly does it appear that such as this is her course also; a path retraced; an action doubled, as it were, upon itself; a power exhibited in opposites, mutually linked together and dependent. This is her life, her harmony. A poor and superficial view it is that finds mere discord and disorder in this destined

interlinkir ; of truth with error, and co-operation of disaster with achievement. Seen with a clearer eye, does it not reveal itself rather as the very mystery of life? of life, which finds its basis in decay and draws support and progress from its ceaseless interchange with death. That is the perf no element of human weakness, or xcluded; which absorbs and turns all that most seems to threaten it. nd grows through error, a success wi tributary—before what obstacles shall they suc The progress of man's thought, the achievemen nds, are most assured in this, that they are serv ir enemies, strengthened by that which seems to u ne them. Linked, in a word, with nature, and holding verily by God's own right hand—though he knows it not, or has forgotten—man shares the very privilege he envies; possesses what he vainly seeks.

XV.

ON MIRACLE.

(*April* 1866.)

It seems a pity that—owing to the feeling we have that reducing things to law separates them from their immediate relation to God—there arises a perpetual opposition (felt more or less distinctly by most men, if not by all) between science and religion; at least between science and religion in its emotional, if not in its theological aspects. The perpetually recurring difficulty about prayer, brought of late into so great a prominence, illustrates, while it also establishes, the fact of this opposition. It may seem easy to remove the difficulty by the affirmation that the laws of nature are themselves a direct expression of the divine activity; but, if we may judge by results, this solution is for the majority of people rather verbal than real. To me it appears that the view last suggested truly contains the key that is needed, but that it co-exists, at least in the minds of many, with certain other ideas which prevent their applying it efficiently.

These ideas also appear to be very intimately connected with the doctrine of the miraculous, for the miracle—the essential character of which is that it is at least an apparent suspension of the laws of nature,—stands before us (who believe in miracles) as a special

exhibition of the divine energy. We can hardly help feeling, th t in a miracle God comes nearer to us, that it is an ever in which something that otherwise intervenes between m and ourselves is put aside. Thus, to our feeling t miraculous becomes the specially divine, which is t that the non-miraculous is to a ce Nor does it avail, that in our re udiate this conclusion; we do bu in ourselves, unless we can also c origin of the feeling we repudiate. impression will become the servant nterpret it; the weakest absolutely r d.

I venture to think, therefore, that a really hearty acceptance of the teaching of science on the part of religious men,—and what is, perhaps, even of more consequence, a cessation of the feeling on the part of men of science that religious men cannot accept its teaching, depend in a very great degree,—upon an advance in our conception in respect to miracle.

And thus: the miracle (all will probably allow) is designed to reveal to us the fact of God's presence and operation. Let us ask ourselves, then, How does God reveal Himself? How has He done so? How, so far as we can conceive, must He do so? The answer surely is in each case plain. To reveal His heart and life, He emptied Himself, and took part in our infirmities. He revealed Himself by (so to speak) putting aside infinitude; making Himself less, that to us He might be more. Nay, how should He do otherwise to come within the range of vision so contracted, a heart so narrow? For us to see God, the infinite must become finite, the perfect submit to imperfection, the untemptable struggle with temptation.

It is by a limitation God is revealed. Rather, He withdraws Himself, than brings His infinite closeness nearer, when He would have us feel His presence; puts barriers between us rather than casts them down when He would have us,—not touch Him, indeed—but know that we touch Him. As between the infinite light and the darkness of our eye, the more is less, the less is more; it is when the noontide fades into the evening we can look upon the sun. This is surely true under every aspect; infinitude is practically inapprehensible by us. Let that which is constant cease, and its existence is perceived; that which is all-pervading be partially withdrawn, and our consciousness is evoked. The bearing of this on miracle is evident. We may well allow that the divine action excels ours, not only in magnitude, but in character. In ours, necessity is wanting; nay, we cannot, without a certain difficulty, conceive it present without abolishing our agency. In God's action it is not so; necessity does not exclude His agency, but stamps it as divine.

This lesson, science, if it do not really exclude God from nature, emphatically teaches us; but God's action, which includes among its characters necessity (that which we have been taught to call law), how should it *appear* to us to be His? It is too much for us; too all pervading—too divine. In it we live and move and have our being; we cannot put it away from ourselves, point to it as at a distance, and say—"Behold, there is God!" Embraced and buried in it, as in the all-surrounding air, we seek for tangible proof of it in vain; we cry with Job, "Oh that I knew where I might find Him!" "Behold, I go forward, but He is not there; and backward, but I cannot perceive Him. On the left hand where He doth work, but I cannot behold Him:

He hideth Himself on the right hand, that I cannot see Him."

It is a cry that God has heard poured forth in passionate complaints from thousand human lips, or more pitifully acted on knees bent down to idols or to Mammon. [illegible] red into the ears of the Lord God [illegible] into His heart. He has made [illegible]. How?—by coming nearer?—b[illegible] foolish heart, that would think so [illegible] own path with darkness! How [illegible] that is everywhere reveal itself; a [illegible] never absent within us or without be [illegible] us as a thing apart? There is but one way: it must be made less; for a moment, for a point, withdrawn. Then we perceive it —an action to which necessity is wanting, a miracle; an action arbitrary, like our own, the not-divine.

In a word, the miracle is not more divine than the course of nature, yet it truly reveals God. It is God (so to speak) becoming for our sakes less divine,—emptying Himself, exhibiting Himself as sharing the imperfection of our action, that we may see Him; that we may perceive "that is AN ACT," recognising it as an action like our own. God shares, in miracle, the imperfection of our action; as, in Christ, He shows Himself, sharing the imperfection of our being. So He reveals Himself; but, truly, not as in a special act, but as everywhere and for ever acting: the All-doer; save, indeed, where our arbitrariness comes in, and He is not. Yes, truly, God reveals Himself in the miracle, as in His Son, by accepting imperfections.

There is an analogy to this thought (as surely to all true thoughts) so close and exact, that it would be hardly just to the subject to leave it unmentioned. The

air surrounds us, presses on us at every point, and because of this absoluteness of its presence, is unperceived; but let it be partially withdrawn—a vacuum made, and we perceive an action; apparently the action (the suction) of the vacuum, but in truth not so, it is the all-surrounding pressure we perceive. The vacuum brings to our consciousness for a moment, and at a point, the ever-present all-pervading air; its pressure is presented to our apprehension in this inverted form. Naturally we think of it as a special act; but when we recognise it as a special absence, the whole truth stands clear.

Blessed be God, that by miracles He has taught us to know that He doth act. More blessed, that His action is not in the miracle, but in that ever-constant order, the necessity of which has its root in Love, its uniformity in Holiness. More blessed, that He has given us the privilege, not of beholding miracles—(even though we "ate bread and were filled;" nay, though we received our dead raised to life, as even night is beautiful with stars)—but of witnessing in the silent unfolding of the great law before us, by new even though as yet unconscious prophets, the proof that all things are of Him. What if dawn banishes from sight—nay, almost from belief—the nightly glory of the heavens? It is the sun arising.

XVI.

SHORT [illegible] QUESTIONS.

NO. I.—A [illegible] LORD BACON.

MAY 1866.

A PASSAGE in Lord Baco[illegible] y on Truth" has often afforded me a good deal [illegible]ment. He says, speaking of a certain class of [illegible] "There be that delight in giddinesse; and count it a bondage to fix a beleefe; affecting freewill in thinking as well as in acting." I do not know that we do very often, in these days, meet with people of this sort, an affectation, at least, of rationality having become the fashion; but the idea of them seems to haunt my fancy, and in imagination I have often made their acquaintance. Surely it would be a pleasant refreshment, after a hard day's work amidst realities, to pass an hour with a friend who thought just as he chose, and verily asserted as his sincere belief whatever pleased him best. It would be as good as a trip to fairyland; and, indeed, in fairyland (where we must be excused for transporting the reader in such haste) we might imagine ourselves confronting a being who not only assumed, but really did possess freewill in thinking. I think it is worth our while to try and conceive him—a person with all the outward form and figure of a man, called upon to fulfil life's duties, yet with a notion that two and two might make five when convenient, and that if it suited him best, to-morrow would obligingly come before to-day.

Let us conceive the man, moreover, proud of this power of thinking as he liked, and supposing it the true intellectual prerogative of manhood; drawing advantageous contrasts between himself, whose thoughts were free, and the poor creatures who could think only in one way. Imagine him feeling himself to be not wanting, but in possession of, a power. That would really be freewill in thinking. And it would be, as we see, simply the absence of the rational nature of man; it would be a seeming power coming into existence by a want. The true faculty of thought is based upon necessity, it has no freedom but in the inevitable fulfilment of law, choice is its death. Our man, endowed with a freewill in thinking and proud of it, is precisely, so far as reason is concerned, an idiot.

It is worth our while, I say, to imagine this picture, because perhaps there is another which may be put by the side of it, and that picture is ourselves. This I affirm, that man, in his seeming prerogative of freewill in acting, is the spiritual idiot of the universe, and that the power of acting rightly or wrongly, *as we choose*, is no other thing than the want of the true spiritual nature. It is the nature of action, as of thought, to be necessary; nor has it, nor can it have, other freedom than in a fulfilment of law, inevitable and without possibility of deviation.

Our freewill is simply the expression of a want in man. We are proud of our arbitrary power of doing, as an idiot might be proud of his arbitrary power of believing.

Two objections, however, immediately appear to rise against this view, one, that as a matter of fact, our freewill or power of moral choice is the distinction which raises us above the things around us. We are superior to *things*, if not exclusively, at least pre-eminently, in being called upon to take our stand for right or wrong;

and if we were not, we were no longer men. The second objection is like unto the first, and is, that to conceive our action made necessary is to conceive it reduced to passiveness, and make our deeds truly our acts no more.

To these two objections the answer is one. Our action, although ar[illegible]is above things which have no relatio[illegible]tive one, to action; as even an a[illegible]cing would elevate its possessor ab[illegible]e no relation whatever to thought. An i[illegible]he full sense he cannot be called a man, is, [illegible]han a stone. We may say of him that he [illegible]nan.

And so we may sa[illegible].

We are legitimately proud of our arbitrary action because the true action is not presented to us wherewith to compare our own; so might an arbitrary thinker be legitimately proud if the range of his experience presented to him no thinkers in the true sense of the word. Nor, doubtless, can our false pride cease even to be legitimate, so long as our sensuous apprehensions bound the scope of our thoughts. But it is seen in its true light when we suffer them to rise where our own best experience and our religious faith unite to call them. Of action that is necessary, and yet not passive, that is most perfect because necessary, we do know. We ascribe it to God; it is His great prerogative with whom "it is impossible to lie." It may baffle conception, but it is not hard to faith; even to the heart it is easy also, for in our own experience we almost know it too. In our best moments, when God's lovingkindness shines on us most brightly, does He not seem almost to share His own privilege with us, and show us how necessity and action are at one in Him? He makes them one in us, banishing choice,

making choice hateful to us, by a compulsion which is not bondage, a necessity we recognise as Freedom.

The standard that we take determines our feeling here; and for the standard of humanity we look in vain if we do not look to God.

Necessity and action, then, truly are one and not opposed; the type of action is God's action. The want that is in us making our action arbitrary, and the limitation of our sensible experience which presents to our eyes no action of the perfect type, have imposed on us the contrary thought, from which, surely, sincerely to reflect is to be free.

One or two thoughts may be added. The argument rests on the basis of a want in our own nature; it is enough to say, surely, that this is a known fact; we make no assumption to meet the exigencies of the case. If human life has any significance, if the human heart and conscience are not dreams, it is a "true cause" that we assign. We have said, too, that the seeming possession of a power comes by an absence; to this also manifold experience testifies; not to refer to more instances than one, how much false feeling of greatness comes by mere absence of humility.

And finally, what would come of the possession of an arbitrary power of thinking? What but just that which does come from arbitrary power of acting?—failure, loss, grievous error, distress, ruin. And what remedy, but in learning to think as thought would be if its necessity were not wanting; and then, if it so might be, the restoration of the intellectual life?—*our* remedies, through God's goodness: first, learning to act as if necessity were, where alas! it is not, and in the end the raising up—how can we say it, but—to Life?

II.—A FRAGMENT ON FRAGMENTS.

JUNE 1866.

KNOWLEDGE comes to us piecemeal. If we look at a child we see that it learns by the gradual accumulation of minute items of intelligence, which its little faculties must be often put together as to make any reason at all. And when men address themselves to the task of understanding things in a wholesale way, they find that they have to learn to interpret fragments. For can be altogether thus described? Even sciences, what are they but fragmentary impressions on as if they constituted wholes? The floating of a feather, for example, is but a fragment of the great phenomenon of weight; the tides are another fragment of the same; the planetary motions exhibit yet another. Fire is a fragment of chemical affinity; respiration another fragment; the rusting of our knives another; light, heat, music, are fragments again, fragments of one thing—vibration. So, if we went on through the entire domain of Science, we should surely find that it might all be thus described: it is the interpreting of fragments. If, indeed, we consider, do we not see that it must be so? Our perceptions must be partial, our consciousness fragmentary, by the very limits which constitute us what we are. Nor need we in the least degree complain (nor indeed do we); for if we have but fragments to begin with, these fragments yield us in the end very satisfactory results, and much pleasure in their attainment. Our faculties are precisely adapted—exquisitely adjusted, indeed, it seems to us, if we had time to pursue the subject, to the work they are called upon to perform. The interpretation of fragments

is just the thing which man's intellect, rightly used, can do; which, when it is rightly trained, it most delights to do. To have fragments given us is to possess the sure means of knowledge.

One thing, however, needs to be noted, obvious though it is; that the fragments which are given us to begin with are often, by virtue of their being fragments, most unlike that which a complete knowledge shows them to be; nay, are most exactly adapted to mislead us: see the floating feather, as remarked, or the rising of water in a vacuum, as instances of the effect of weight. But this matters little. The illusions arising from causes such as these are illusions which we can, and with infinite profit to ourselves in the process, correct.

From fragments to learn wholes, or out of natural illusions to arrive at truth (which is the same thing), this is manifestly man's problem. We refer to it for this reason, that it seems to us to contain in a clear and matter-of-fact form, the essence of the much-vexed question of the "Authority of Consciousness." Those of us who have not yet outgrown that weakness of the world's infancy, a fondness for metaphysics, are aware that this has become a grand problem in recent times—whether we can trust consciousness; and if not, whether we can have any certainty at all, or must not ever flounder in a hopeless quagmire. This question has been argued and re-argued, and one sees no end. But does not the whole perplexity arise from this simple cause, that the nature of our consciousness to be fragmentary has been forgotten? We may trust our consciousness, certainly, *to give us fragments.* This is what it ought to do—all it ought to do. That we so desperately suspect we cannot trust it (our desperate affirmations to the contrary being the sign of this

suspicion), because we have been trusting to it to give us more. We may call it more, for argument's sake; but in truth, any such *more* were infinitely less.

We receive from our consciousness *fragments* in the metaphysical, just as in the physical or scientific sphere. And for fragments we may trust it in each sphere alike; in each also, that is, knowing that it will cheat us, its chief misuse being (above all the) it gives us fragments only.

All this is in c or rather affirmed, by the doctrine of nature, and the partial character of his . It would be curious that it should have been so overlooked in the sphere of metaphysics, if there had not been so many like cases, in respect to men's thoughts of things physical for example, to take off the edge of the singularity.

Consciousness, then, in respect to ourselves, as well as in respect to external things, gives us fragments. Thus, for instance, we have a fragmentary consciousness in respect to our power of physical exertion. We are conscious of the power simply as our own, as if it were inherent in ourselves; but this is evidently a fragment. The power by which we move our arms is not inherent in us; it is derived from our food, and is the very force which was in air and herb. We are conscious again of a power of freewill—of arbitrary acting of our own choice—truly conscious of a fragment. What our freewill is—the interpretation of this fragment—has been before suggested in these pages. We are conscious, also, of being in, and surrounded by, a material world; again a fragmentary consciousness, open to, and soliciting an interpretation. So our consciousness of an isolated individuality—personality as we perhaps mis-

takenly call it; for surely God, and not ourselves, is the true type of personality—this is a fragment too. And in the moral region again, our consciousness of pain, of sin, of virtue, and of joy; of God's absence—nay, even of His presence—these are fragments. Shall we fear to learn their interpretation? to find in them more perfectness of reason, a wider harmony? Granted that it were to rise above ourselves, may we not rise nearer God?

God has made everything double; one over against another. Everything in Nature has in Nature also its symbol. And in respect to this task, this privilege, of interpreting fragments, we see the symbol in geology. When the Palæontologist, taking the fragment of some long-lost and buried animal, re-constructs from it the whole, he represents the total work of man. That is the universal problem: from the little given to find the much withheld—best given in that withholding.

This is the sum: the "Authority of Consciousness" dispute rests on a strange yet natural oblivion of what our consciousness must be, and ought to be for its greatest final use. Wholes have been sought, when fragments are all that can be given; and are besides the best that can be given. While these fragments yet await even a serious attempt at their interpretation, may not discussions—surely now proved futile—as to what consciousness does or does not vouch for, and how far we may trust its vouching, be at least deferred?

NO. III.—OF NATURE.

JULY 1866.

I AM gazing on a glorious landscape. From the hillside on which I sit, as far as the eye can reach, the plain stretches out before me in all the freshness of the early summer; green, and brown, and gold exquisitely mingled,

and overa[illegible]ched by a sky of the deepest and tenderest blue. The declining sun casts long lines of shadow athwart the scene, toning its brilliancy as by a faint whisper of coming rest. On my right hand rises in the distance a[illegible] amphitheatre of hills, while close beside me on the left stands a group of oaks, from beneath whose shade com[illegible]usic of childish voices. As I drink [illegible]almost to raise the soul to heaven; [illegible]ve that this is a portion of that poc[illegible]n sins, and suffers, and seeks rest in vain [illegible]ere surely cursed with that primal sin [illegible] craved an abode more glorious. And [illegible] it is not enough even for me; the eye seems [illegible]traitor to the heart—it speaks an infinite promise, but the fulfilment fails. The charm it sees in Nature is like a halo round the brow of an inquisitor; it is the face of Nature that is fair—her heart is stern and cruel. She may fill the child's lap with flowers; she crowns the man with thorns.

And no wonder; for what do we find when we examine this enchanting beauty? What, but that it is a transparent cheat? Hear the philosophers discourse of light and colour; they are fictions only—baseless fabrics of a "vision," which, as they vanish, leave nothing behind but so much motion. "The splendour of the firmament is the transmitted *shiver* of bodies millions of miles distant, which translates itself in our consciousness into the aspect of the stars." This shiver is conveyed through an all-filling ether, as substance "almost infinitely more attenuated than any gas, but its properties are those of a solid rather than of a gas. It resembles jelly rather than air. . . . . Both light and heat [and all the other forces that we find in Nature] are modes of motion."[1]

[1] Professor Tyndall, "Fortnightly Review," December 1865.

Here is clearly put before us the problem of perception. In one way or other we do not perceive Nature as it is. The view that we are taught to take, and in which, though surely not without some unanswered questionings, we for the most part acquiesce, is, that we perceive it as *more* than it is, marvellously and quite incomprehensibly more; for it is needless to remark that no one has yet suggested even the hint of an explanation how or why mere motion should make us perceive light, colour, beauty, the soul-moving harmonies of sound, every thrill our bodies feel of pleasure, every pang of pain. But the causes of all these things, so far as they are in Nature apart from us (we are taught), are motions merely—vibrations for the most part of small particles.

This view—that matter and motion give us our perception of Nature—appears to me totally untenable on many grounds, but I waive, for the present, all other arguments but these; namely, that it is opposed to what we know in all cases with which the question can be compared, and that the fragmentary nature of our consciousness gives us a solution at once more reasonable in itself, and more comformable to experience. First, the idea that the impressions we receive from Nature surpass the object which causes them is opposed to experience in all cases in which we can put the question to the test. It is enough to refer in general to obvious circumstances—that the eye can perceive only a part, cannot indeed penetrate below surface, and that the apparent bulk of objects is ever less than their true dimensions. If we take the sense of touch, on the other hand, the extreme inadequacy of the impressions which it gives us is manifest. It is but a very small part of any bulky object that the hands can feel at any given time, and many qualities of bodies are altogether beyond their reach. In short, the idea

which we form of any solid object is based, not merely upon the impressions conveyed to us, but upon a mental process of reflection, by which that is thought of as existing which is not contained in our impression; we add the unseen parts: if it be distant, we allow for distance—we include weight: we recognise the substance as filling, ture, all the space it occupies: in not as we do perceive it, but as rceive it if we perfectly examined us, we add what is not, what cann sion of it. Therefore, when I am ture as being less than my impressio so is contrary to my experience—that is, to perience of a like kind which I am capable of putting to the test.

There are, however, one or two apparent exceptions. First, there are pictures which produce upon the beholder an impression far surpassing that of a merely coloured surface. To this it is to be said, that in so far as the impression is other than that of a coloured surface merely, it depends upon the spectator's previous knowledge, and is an act of thought; the feeling is mental, not sensational, and therefore is not parallel to the case we are considering. Much might be said on Nature regarded as a picture, but it does not belong strictly to our present subject. Again, there are objects like the kaleidoscope, in which by a simple mechanism, more or less beautiful and surprising results are produced upon our senses. It might seem that here we have an instance in which the impression surpasses the object; but the case of the kaleidoscope appears to me one of the most striking arguments on the other side. In the first place it is true the symmetrical figures presented to the eye are not in the instrument; but there is in the instrument an arrange-

ment of reflecting glasses; and, secondly, the case is most precisely opposite to the view of Nature that I combat. In the kaleidoscope there is found, on examination, an adaptation to produce upon us the impressions we receive from it. In respect to Nature the case is the reverse. Here we seem to find, upon examination, no such adaptation. What we are called on to believe is, that mere motions produce in us ecstasy and horror—the very raptures of heaven, the extreme of awe; a belief which, if there were no other grounds for rejecting it, even so small an example of the reason that is in all things as the kaleidoscope, would forbid us to entertain. Examination discovers reason in the one case, banishes it in the other.

I repeat, then, that to suppose the impressions we receive from Nature are caused by matter and motion is contrary to all experience. There is, secondly, a better thought upon the subject, presented to us in the reflection that our consciousness is fragmentary. Doubtless, Nature is not less than our impression; but may we not with just as little doubt affirm that it is more? Though, in our perception, it is not magnified, it *is* made less. If we would know Nature truly, how should we proceed? what course does reason dictate, experience sanction? It is this: to think of it as an existence, truly containing qualities and powers which escape our immediate view; powers which are adapted to effect all that Nature works in our experience; all impulses of delight or agony, of passionate emotion or solemn aspiration; but which cannot be measured even by these. Deep as our apprehension may be, and doubtless truest when most deep, it is but a fragment still.

And here, it seems to me, is the clue (not really less probable, because so simple) to the idea of Nature, as

"matter or force," which has obtained so firm a lodgment in our minds. This idea is but an instance of a fragmentary consciousness, reasoned on as if it were a whole. Taking their partial perception as the basis of their thought, men have inferred a theory which proves, of course, insufficient for the facts. The natural supposition of a principle to account for the rising of certain bodies. Here was a partial perception—the thing seen, but not the superincumbent. A false supposition followed, corrected by a larger knowledge, and an allowance made in thought for elements unperceived.

In fine, Nature cannot be "matter and motion," because of what it does; but that notion has been forced on us by the fragmentary nature of our consciousness, whereby a partial apprehension has come to be treated as a whole.

XVII.

THE MYSTERY OF PAIN.

THE thought which is sought to be conveyed in "The Mystery of Pain" is a simple one. For instance, we all know that there is a very great pleasure in giving; indeed, if we are very fond of any one, there is no pleasure so great as being able to give him something, or to serve him in some way by our labour. Let us take a small instance to begin with:—Suppose a father has a sick child; has he not much more pleasure in giving an orange to the child than in eating it himself? And would he not rather himself give the child an orange than that one should be supplied to him by any one else? He has his best pleasure in going without that the child may have. So, too, does not a husband—if he deserves the name—delight to take some trouble, or go without some little pleasure, that he may give pleasure to his wife, and the wife for the husband, and the child for his parents? And is not this the best of all pleasure when we do not merely enjoy ourselves, but when we cause those we love to enjoy themselves?

But this simple fact contains, like a seed, the whole thought of the book, which is, that our sufferings really are a giving to others and serving others, though possibly we may not see how. This case may be imagined. Suppose a person loses out of his pocket a small sum of

money: of course he is sorry. He is not willing to lose it; it is a pain to him, perhaps a very great pain, and would seem quite a useless loss. But suppose, again, that by some accident this lost money fell into the hands of a dear friend of the person who lost it, and that it saved his friend from some misfortune, perhaps kept him from starvation or ed him from robbing. Then would not the pers lost it—if he came to know of this good result o oss—be glad instead of sorry? Would he not be to have lost it, instead of unwilling? If he w nerous man, he would. And then, as soon as he his friend had had the money, it would be just t as if he had given it to him. It would be as much his gift to his friend, when he once said, "I am glad you had it, and you are quite welcome to it," as if he had put his hand into his pocket and given it to him. And he would have just the same pleasure in serving his friend so—although he did not know it at the time, and was very sorry for his loss—as if he had gone to him and said, "Take this." Perhaps he might have even more pleasure: he might be all the more glad because his friend was helped by his loss without having to receive charity from him. Indeed, it might be, that if he had wished to help his friend, he might not have known what he wanted, or his friend might have refused his aid. And so his not knowing about it might be the very means of getting him that great pleasure of helping one he loved. So we see that, if others are served by our losses when we do not know, that does not make our pleasure less when we do know, and does not prevent the service being our gift to them, as soon as ever we are willing that they should have received it through our loss.

This illustration is used in the book; it might possibly

be objected, that in using money thus found, honesty would be violated; but this does not affect the argument. Any other service rendered unknowingly to a friend would illustrate it equally well.

In fact, it is so good a thing to serve others that the goodness never can be got out of it. It may be hidden from us, so that we may be grieved for what we should rejoice in if we knew all about it; but it cannot be lost. Only let us come to know and be willing, at any time, and then we have all the joy and all the good of our service just as if we had known and intended it from the first.

Letters are sometimes written in an ink which becomes visible only when warmed by the fire, and a service unconsciously rendered to another through our own loss is like a letter written in such invisible ink, the words of which exist none the less truly because they are not seen. Our knowledge and our love are like the fire which brings them into view.

Some things, then, may seem to be very bad, and yet truly be very good; nay, may be among the best things that can possibly be. For it is wonderful, when we think of it, how much better a thing it is to bear something painful for another than for ourselves.

It is very often the case that losses or pain do a great deal of good to the person who suffers them. They may make him wiser or more careful; they may even warn him from sin and break the influence of bad habits, and in this way be the source of infinite blessing. And because of this good they do us, by God's loving will, we may be and ought to be willing, and even more than willing, to bear them, sharp though they may be. They are mercies in disguise, even though they should seem to render service to no one but ourselves. But when we

know that a pain or loss of ours does good to some one else, to son e one whom we truly love, then it is a very different tl ng. Then we are not only willing to bear it as the least (two evils, but we rejoice in it; we are glad of the opj rtunity of bearing it; we would not part with it. Look hild. Does she not rejoice in h *like* to put it off upon another? mother. Which would best rewa ith the waves, to save one's own escue a drowning man? Which wou rs think best, to undergo their to rymen in Venice, or to gain someth

This, then, is the way in which it is proposed in the book before us to look at all the misery and sorrow in the world; to think of it as being borne, not by each one for himself, but by every one for others; as serving others in some unseen way. So regarded, it is truly a good, even now, while, because its uses are unseen, we feel it as an evil; and it may be destined—is destined—to be the highest and most perfect joy of those who have suffered it, to be their dearest possession and delight hereafter, when in the future state they are made to see and know the good that it has done, and shall say with all their hearts, "I give it freely for that end; blessed be God, who has given me, however blindly, however unwillingly, the privilege of serving." From this thought the following words proceed—

"There are the materials, then, evidently within us for an entire change of our thoughts respecting pain. The world in this respect, we might almost feel, seems to tremble in the balance. A touch might transform it wholly. One flash of light from the Unseen, one word, spoken by God, might suffice to make the dark places

bright, and wrap the sorrow-stricken heart of man in the wonder of an unutterable glory."

"If all pain might be seen in the light of martyrdom: if the least and lowest in man's poor and puny life—or shall we rather say, in God's great universe—might be interpreted by its best and highest, were not the work done? It is done, for the light has shone, the word is spoken."

That is, God has revealed to us in Christ both that His own life is a life of sacrifice and service, and that ours truly is so too; and also He has shown us what service it is that our losses and sorrows render to the world. He has shown us man's need of a new and better life, of a higher nature. He has shown us that He is the Redeemer of mankind, and that He is carrying out that redemption, and raising men up into a higher and holier state, making man like Himself. This, God has shown us, is the work He is doing in the world; and this work of making mankind perfect is helped on by all that we are called upon to bear. God is the great Giver, and He is giving life to men; for this is not man's proper life which leaves him as he now is, prone to sin and selfishness. God is giving the best of all gifts to men—a new and holy nature; and when He lets us suffer or lose, be it much or little, He joins us with Himself in His giving, makes us the servants of humanity, bearing for it even as He bears.

But in carrying out the thought that we are permitted by God to help His work by our sorrows, it is not meant to imply that the sins of others are laid upon our head, or that our sufferings have any merit. Christ has made the one sacrifice, and worked the full salvation. But then this work of raising man to holiness, which Christ has rendered possible once for all, is now being carried out—

is being carried out in all things, and in our pains and our losses among the rest. Not that these have any special virtue, or bear any special part; they are only God's special gift to us of serving. He does not need our services indeed, except as love *needs* the best blessedness of all it love[illegible] without it. But, being Love, He ca[illegible]s He gives us the best thing He has t[illegible] o join us with Himself in giving. A[illegible]om for his child's gifts among his own, and [illegible]o supply all domestic wants, and so complete[illegible]es, that the child shall have no opportunity to [illegible]te, so God makes room for our giving, gives us [illegible]ies to bestow our mites of service, takes us up, and [illegible]s with Himself as the givers of life to man.

These are our losses and our pains; this is our wretchedness; this glory clothes the darkness of our grief. And surely we may at least say this—if God would give us the best and greatest gift, that which, above all others, we might long for and aspire after, it is this that He must give us, the privilege He gave His Son, to be used and sacrificed for the best and greatest end. Nothing else could so fill our nature or satisfy our hearts as this, that Christ's own life should be renewed, His work fulfilled in us; that we should be united with Him so, and feel St. Paul's words true of our own poor and blank-seeming sorrows, "I fill up that which is behind of the afflictions of Christ," our sufferings being related to an end which is not merely ours; an end, that is, of all ends, the greatest and the best.

But it must be remembered that the result which thus glorifies and makes good the painful part of human life is one that we cannot see. We can, indeed, now and then, trace how the sufferings of some do work good for others.

How often does the sudden death of a neighbour turn men from evil courses, or the grief of parents touch the hardened feelings of a son. So, too, the world is benefited by the strength its teachers gain through sorrow, and the blood of martyrs secures their children's liberty. And even in material things society is advanced by the sacrifice of its members, and the losses of one generation give birth to the successes of the next. The loss of life in mines and manufactories leads men to the means of safety; shipwrecks improve navigation; the bones of discoverers whiten the plains that future generations see white with harvests. But it is not of such visible results that the book speaks. The good that is being worked out in man is one that is not within our view, but is often wrought in events that seem most opposed to good. It is the regeneration of our nature; a change so deep that it involves the loss of much that seems very good to us, much that would satisfy us; for it is the raising mankind up to a goodness that satisfies not us, but God who sees not as man sees. So it is by faith it must be known and felt. But, as it is pointed out, this is not a strange demand, or one that should make the thought seem less likely to be true. In almost all cases whatever, we see and know so little that it is only by thinking of that which we cannot see, and should not naturally think, that we can form true opinions. On this point the book contains an argument which we need not follow into detail, because, in fact, the simplest reflection is enough to prove the point. We see so very little of the effects and connections of things, that we may be sure their true meaning will depend very much on what we do not see; therefore, when it is said that all human experience is the bringing about of the restoration of man's nature, it is no difficulty in the way, or evidence to the contrary,

that it is not visibly so. It demands faith; but faith is the only true reason, for it alone takes into account that which is not seen.

There is one other thought which it is necessary to bear in mind, and that is—that to make sacrifice for others always joyful to us, our own life must be made more perfect. It would not be enough to make us good, or to make us full of love; we must have a more perfect nature too, and that is heaven. The joy of heaven is a joy in giving up, and there we shall have a nature fitted for it. Here we may be willing, but we groan beneath the pangs, as even Christ groaned, sharing our infirmity to redeem us from it. He *emptied* Himself that so He might feel sacrifice as pain. But in God we see perfect sacrifice in perfect joy. He gives always and infinitely, does that which is loss and sorrow to us, lives in sacrifice, and is wholly blest. Why, then, is sacrifice pain to us?

This is the answer:—Sacrifice, or giving, which is in its true nature joy (as exercise is pleasure to a healthy man), becomes painful to a being who is, as it were, under disease, who is marred and weakened, and has not his full powers of life; just as exercise becomes pain to a body that is diseased. A person suffering from rheumatism feels it painful to move his arm; but moving the arm is not properly a painful thing, only disease makes it so: and so we, being as it were diseased in our soul-life, feel it painful to be sacrificed, though that is our proper joy. But there is this difference, a person with rheumatism does not lie and think, "Moving the arms is *a bad thing*, it hurts me so;" he thinks, "I want curing; it hurts me so to move my arms." But we, feeling pain in being sacrificed (which is our *giving*), do not say, "I want *curing*, for I feel sacrifice painful;" but, mistaking

sadly, say, "It is a bad thing to be sacrificed, it hurts me so." Bodily health loves exertion, and can only so endure to live; the life of man loves giving, and in giving only can endure to be. That is heaven; but to aspire after heaven is our privilege, our duty, here, as sickness aspires after health.

God wants our children sometimes, and we cannot part with them; it rends our hearts: but it is not a bad thing to give a child to God; it is a bad thing for human life to be in such a state that we cannot give it but with intolerable pangs.

But we may well ask, how can this be proved? Well, there are many proofs; some lie deep down in science, which proves all things to be necessarily joined together, and to constitute some undiscovered whole; some are in reasonings which go to prove that the world must be made thus, and that loss or suffering which is not giving cannot be; but there is another proof, open to us all, and that lies in the heart.

Milton says—

"They also SERVE who only stand and wait."

"And if they who stand and wait, do not those who suffer too? Is it conceivable that God should give to some, whom He blesses with health and vigour, and large gifts of influence, the privilege of greatly serving Him, of doing a wide work of use for others; and that this privilege, which none else can equal or supply, He withholds from those from whom He takes health and strength, and every gift but that of suffering? Does He give the one the blessedness of serving, and refuse it to the other? 'Are not my ways *equal*, saith the Lord.'

"If our life were ordained to be good, truly, satisfyingly good, it could be made so only in one way. It must be a life

of sacrifice, or all other goods fall short—we know they fall infinitely short—of this; and it must be sacrifice for unseen ends, because the best ends must be unseen by us. To be the best, our life must be sacrifice, and for ends unseen. It must be, therefore, to us, just what our life is. Must we not believe, then, that our life is this—the best?

"In its fru[illegible]id failures, it fulfils the conditions of [illegible] presenting the highest form of good, [illegible] the best ends. It is this God calls upo[illegible] a demand He makes for faith, showing us, [illegible]rm it, a life like our own, of sorrow and hu[illegible]on; this unlike our own, unlike only because th[illegible]ro[illegible]ater, and the humiliation more profound; a life o[illegible]so[illegible]hich the meaning and the end are no more concealed, b[illegible]nanifest to all. Revealing so the secret of our life, He calls on us for faith.

"Appealing to the heart—to that moral feeling on which the existence of God himself rests firm in man's belief, have we not answer, distinct and clear, that pain must be sacrifice; a privilege, and not a loss? Does not the thought, once seen to be possible, affirm itself as necessary, and refuse to be held in doubt? Does it not link itself with the belief in God, so that we are compelled to say, that if God is, then pain is sacrifice—sacrifice for man? For if we think otherwise, then do we not choose to join evil with His name? Not to believe our pains serve other's good is but to contradict the very evidence on which we assert His being. Once recognised in its true meaning, the thought ceases to be a question of argument and balanced evidence; it sinks into the soul, and becomes part of that deep conviction on which all religion rests. Pain cannot be interpreted otherwise than thus, when once we see that it can thus be interpreted. The heart rises up from its chains and rejoices. God has revealed Himself; He has manifested joy, and we see it and are glad. Amid our tears we smile, for, when our woes are deepest, then our joys are highest. Then we are likest Him, are nearest to the dignity of manhood; partakers most in that on which all

living joy is based, needing only that our life be perfected to make it joy."

Or if, when we speak and think of human sorrow in general terms, we yet can doubt, can we doubt when we call to mind the real things that we have seen and heard?—the cruel sorrows, the blighted hopes, the life-long tortures that have befallen the innocent and weak, and borne, or seemed to bear, no fruit? widows who have seen their sons consigned to the grave, no potent voice recalling them, or buried in the worse grave of the mad-house; the strong man prostrated, and compelled to leave all that he loved to poverty; the long agony of hearts that prey upon themselves; the cheerless martyr-dom of slow disease untended by loving hands; the wasted homes and dishonoured hearths that mark the track of war; the raving horrors of fire or shipwreck; the slow hours passed in the sick longing for help, and no help has come, but only death—death, whose grim visage has grown beautiful so often beside the more abhorred face of life. Have all these things been for NOTHING?

And that one great Sorrow, the shadow of whose black-ness has made earth more bright for ever, shall it for ever fail to teach us how dark the glory of man's life may seem?

But we must end. There is a deeper and darker problem in the world than pain; and of that this little volume does not speak, nor here do we. Pain and Sin are not one mystery, but two; and, though in some respects closely linked, are not always allied. As man rises he often suffers, more, not less; and sorrow almost as often seems a privilege bestowed on goodness as a chastening on vice. Sin retains all its blackness, though we know that pain is joy misfelt.

Still we may ask—Would it really console us in our griefs, and thus aid us in our struggles, to be sure of this? Could we be glad in losses and distress even though we were sure that in them we were sacrificed for man? No; if in our pleasant days our thoughts never or but seldom turned joyfully to man, and dwelt on it in gladness, when sorrow struck us, we dwelt wrapped in our interests, or the narrow sphere of our affections, then the thought of man's redemption would bring us little comfort in our griefs. It would be a doubtful compensation, if we then could think of it, and to be glad because of it. Only if the Lord of the Lord consent to become our strength; that were to seek selfishly an unselfish bliss, which cannot be. But this may surely be, that all of us should take up again our long-lost privilege of being glad for man, and rejoicing for his sake all the day; long lost, but never forfeited, because it rests upon the infinite bounty of that great Heart, with whom to Be is to bestow. If we could live as seeing the invisible, ceasing to cramp our thought and crush our hearts within the too narrow sphere of things perceived—marring the fair proportions of our life, which should be moulded to the truth of things, and not their seeming—if we could live thus, ever happy in the thought that in all things God is raising man, finding in it a keener joy in all delight, a deeper sacredness in every duty, then our sorrows might be lightened by it too. No longer strange and unfamiliar, it would come to us then as a long-trusted friend, and say, murmuring sweet comfort in our ear, "See, God, who is in all things giving His life to man, accepts this gift from you."

XVIII.

GENIUS.

DEC. 1863.

IF there is one thing which, more than any other, might seem to be beyond the sphere of explanation, and above all possible reducing within the bounds of law, it is perhaps the mysterious gift of genius. Almost as well might we seek to explain creation, or trace to secondary sources the soul itself, as hope to find any other origin than the Maker's direct endowment for that transcendent power, apparently the most capricious and the most unfathomable attribute of the mind of man. Questions multiply on us while we think of it. Why does not genius appear oftener than it does? or why so often? What determines it to this or that individual, in whose circumstances there may have been nothing to warrant the expectation of it, or to favour its growth? Why is it so often linked with peculiar weakness? Above all, how is it to be defined? What is the difference, felt even by those who might be disposed in theory to deny it, between genius and talent? What is that indescribable power, different from any result of toil, which compels our homage, we cannot say why? Whence comes that strange insight that goes right to the heart of its subject, making all other men appear mere outside labourers? And why again are its possessors so unable to give any account of it? Why are they so little aware even of its existence in themselves? Why, for instance, did Newton say that he thought there was no difference between himself and common men, except that he could fix his attention more continuously

and patiently than they? And how is it that so many other men of unquestionable genius have disclaimed all special power? Were they utterly mistaken in this? and if so, what is that strange capacity which its possessors are not conscious of possessing, and become aware of only by a comparison of themselves with others?

However often this question may have been asked in vain, it is worth asking again. For if only it could be answered, and thus the empire of law could be extended over this uncultivated region in which imagination yet runs riot; and if this could be done without the sacrifice of freedom; if order here could supersede mere chaos to our thought, and yet only add subtler charm and higher grace to its wild beauty—then what fact is there in human life we might not aspire to bring in turn within the intellect's domain? What part of our experience, loftiest or deepest, might we not hope to see clothed with new glory by a truer vision?

And how deeply, too, the answer to this question would open to us the springs of man's mental history, and reveal the conditions of his progress. The secret of the life of human thought lies in it; for thought lives a life: looking back upon its history, we see that it does. It grows, develops, passes through successive forms vitally dependent on each other. The development theory, failing in its hold upon man's body, might well take refuge in his mind, and claim its antitype in thought. Had not this its obscure beginnings, half-conscious glimmerings, like the first misshapen organisms of the animated world?—rising through brilliant insect-forms of fancy, or sluggish gropings after sensuous good; through creeping reptile-forms of superstition, loving the dark and hiding from the day, fearful, and cruel in their fear; through floating bird-forms of fleet speculation, gifted

with wings indeed, but dwelling in the air; up into the substantial mammal-form of earth-subduing Science? Waits it not yet to rise into Humanity and claim its soul? In the long process of development shall not the breath of life be breathed into the fair strong body of our Science; knowledge becoming manlike, erect, with kingly sway, with queenly grace? Is not the thought-creation yet to have its crown?

We will not discuss the question. Let those of us who feel that our modern modes of thinking might be pitched in a little loftier key, be pardoned the gentle heresy of hoping so. Our work now is not with the future, but with the past, and with the light which we can find there respecting the nature and origin of genius. But in attempting this subject it is necessary to claim the privilege of confining ourselves to narrow limits. The achievements of genius are too vast to be displayed, too numerous to be counted up, too diverse to come within the scope of the most universal information. All that we can do is to select one special sphere of mental activity, and to see how far we can penetrate into the characteristic properties of genius as there displayed, and thus obtain a key to them as exhibited on other platforms. For this purpose, the subject best to choose appears to be rather that of intellectual discovery than poetic or artistic imagination. The mental processes in the former, if not simpler, are at least more definite, and if not easier to trace, may be more within the power of words to express.

It is not difficult to see in the very nature of our minds, and the relations in which we stand to the world we have to study and interpret, a necessity for our taking two kinds of steps in our advance towards knowledge. If we had perfect apprehensions of things to start with,

if we derived from our senses complete and therefore accurate impressions of the objects which we have to investigate, of course we might go on in a direct line from less knowledge to more. We need never be in error, though we might be ignorant. That which we knew might be divided off by a definite line from that which we did not know; the fo eing right so far as it went, and being gradually sed by additions from without, each of which w once, and without difficulty, take its proper rela ition. But seeing that this is not our case, but t impressions we derive from Nature are almost partial, and very often exceedingly confused, our dge cannot, as in fact it does not, advance in any direct way. We want not only additions to its circumference, but often corrections at its centre. The fundamental notions and primary ideas on which all our thoughts are based need to be made more perfect or more true.

Now, this can be effected only in one way. To think more rightly we must first think more falsely. Error must precede truth. We have not forgotten the old form of demonstration we studied in our Euclids, when we were boys—the *reductio ad absurdum;* in which a false supposition being made, it is proved false by the consequences which follow from it. We are continually carrying on this kind of reasoning within ourselves, and guiding our lives by its results. Inadequate ideas, or false suppositions, would often escape detection by themselves; but when we trace them to their consequences we perceive directly that they cannot be true. The premises are unsound, because the conclusions are inadmissible. This is the appointed method of correcting false ideas or rising above untrue assumptions, and it is hard to see how there could be any other.

Now, it is plain that in this course of thought our progress consists of two distinct, two even opposite, portions. There is a building up and a pulling down; the piling up of the conclusions or results, and the overthrowing of the premises or starting-point. By no possibility can these portions be confounded, nor can their order be reversed. They are mutual opposites, and exist for, and by virtue of, each other. The construction of the false scheme of consequences is but a means for the revelation of the truth; that revelation is possible only through that construction. The one is a more or less elaborate effort, the other is an instantaneous insight.

This is a process which takes place within each of us many times every day, and in respect to every variety of circumstances with which we have to do. It is applied to the least and most trivial subjects; but it is also the method appointed for man in dealing with the greatest. It must be so. For where are men's native suppositions and natural assumptions more inadequate and deceiving than in reference to the great questions with which Philosophy and Science deal? Where is a correction of the starting-point more necessary? Now in this necessity, in this law of our knowing, I venture to suggest, lies the basis of the distinction between talent and genius; as from it are deducible the leading characters of each.

Ever there need to be taken, for each fresh achievement in our intellectual progress, two distinct steps: the first an accumulation of results, either by observation and experiment, or by reasoning, a more or less lengthy, often a tedious process; the second a rapid, often an instantaneous one; the use and interpretation of these materials, the sudden vision of their true significance, raising our

apprehension to a higher level. Talent and genius are here.

For these two steps in thought—which in little things each individual takes for himself consecutively, first making and then interpreting his own *reductio ad absurdum*, or proof of mistaken [illegible]t—these two steps are in great things parted, [illegible]ned to separate individuals. The men of tale[illegible] the demonstration; the man of genius sees it.

So the decisive genius [illegible] only once in a way, at an epoch or crisis in h[illegible]ought. It looks like a sudden flash of myste[illegible]t; it is in reality the orderly consummation of a [illegible]rious process; it is no more mysterious or sudden than the explosion of a gun that has been carefully loaded for that very end.

One of our poets, himself an eminent instance of poetic genius, has expressed this very idea with equal exactness and felicity. The passage is in the "Prometheus Unbound" of Shelley:—

> "Hark! the rushing snow,
> The sun-awakened avalanche! whose mass,
> Thrice sifted by the storm, had gathered there,
> Flake after flake!—*in heaven-illumined minds,*
> *As thought by thought is piled, till some great truth*
> Is LOOSENED, and the nations echo round,
> Shaken to their roots, as do the mountains now."[1]

No words could more perfectly express the relation between genius and talent than these. The thoughts are piled, heaped up in gathering mass, until the time comes for the accumulated weight to fall; then the nations are shaken, and the power of a truth is felt.

[1] "Prometheus Unbound." Act ii., sc. 3. Shelley says, "in heaven-*defying* minds," but I have taken the liberty of altering his words, for the sake of retaining more perfectly his thought. By heaven, now, we do not mean the heaven that he defied.

Let us take, as an instance in which the process is seen on a large scale and in well-marked characters, the discovery by Copernicus of the true construction of the solar system. I suppose that every one would admit that this was a work of genius. It may well be called an inspiration. It made an epoch in the mental life of man; it was a revelation of a great and long-hidden secret; it grasped a truth which was in opposition to the strongest prejudices and convictions of the age. The man who saw it had unquestionably the insight which we claim for genius.

How came he to see it? This question resolves itself into two: how was it possible that it should be seen at all? And why was Copernicus the man?

In respect to the first of these questions, the earth's motion was possible to be discovered and proved at that time because the conditions for the discovery had been fulfilled. Copernicus was not the first man to think that the earth's motion was the true cause of our perception of an apparent motion in the heavens. This is said to have been the doctrine of Pythagoras, and was advocated by Aristarchus and others of the Greeks. Nor is it an unlikely supposition to have occurred to the minds of men.[1]

But though thus early suggested, it is remarkable that this opinion had not maintained itself, even as a probable hypothesis. In the days of Copernicus the opposite doctrine was universally established. We know why this was so. The idea of the earth's motion is available

[1] "The Indians also had their heliocentric theorists. Aryabatta (A.D. 1322), and other astronomers of that country, are said to have advocated the doctrine of the earth's revolution on its axis; which opinion, however, was rejected by subsequent philosophers among the Hindoos."—WHEWELL, "History of the Inductive Sciences," I., p. 364. This fact is interesting, as showing that the sequence of opinion on the subject rests on other than accidental causes.

as the explanation of only a part of the celestial motions, and could not be maintained when a more accurate observation revealed the whole of the appearances. The perceived motions of the planets are quite irregular, and cannot be referred to any possible motion of the earth alone.

Observation, therefore, n ted the lapse and loss of the true opinion in t That opinion would not answer the demands accurate examination made upon it. Evidently, ld not; it was partial and insufficient. What to e when men observed the heavens accurately is nough. They formulated the apparent motions ully, and invented an astronomy on the theory of epicycles.

Every one will agree that this astronomy, based on and embodying the most obvious construction of the observed facts, was a work of talent. It is an immense monument of human energy and skill, laboriously and wisely directed. Dr. Whewell says of it:—"That which is true in the Hipparchian theory, and which no succeeding discoveries have deprived of its value, is the resolution of the apparent motions of the heavenly bodies into an assemblage of circular motions. The test of the truth and reality of this resolution is, that it leads to the construction of theoretical tables of the motions of the luminaries agreeing nearly with their places as observed. Such a resolution of the unequal motions of the heavenly bodies into equable circular motions is, in fact, equivalent to the most recent and improved processes by which modern astronomers deal with such motions." But at the same time every one will admit also that the development and elaboration of this system—a false and intolerably complicated one—could hardly be called a work of genius.

We have then before us in the history of astronomy a work of talent and a work of genius; the former preceded the latter. Is there not evident also a more intimate relation between them—a connection of necessary sequence? or could the latter have taken place without the former. Dr. Whewell shall answer for us again:—"It is true that the real motions of the heavenly bodies are simpler than the apparent motions; and that we who are in the habit of representing to our minds their real arrangement, become impatient of the seeming confusion and disorder of the ancient hypothesis. But this real arrangement never could have been detected by philosophers if the apparent motions had not been strictly examined and successfully analysed. How far the connection between the facts and the true theory is from being obvious or easily traced, any one may satisfy himself by endeavouring, from a general conception of the moon's real motions, to discover the rules which regulate the occurrence of eclipses; or even to explain to a learner of what nature the apparent motion of the moon among the stars will be." In fact, in the words of the poet, the old astronomy was the piling up of thoughts essential to the loosening of the great truth it was destined to make known, and the power by which the result was effected is evident. The natural tendency of the mind to simplicity, to necessity, to unity in its thoughts, was violated and placed under coercion by the complexity and arbitrariness of the suppositions which the old astronomy involved. There was a restraint felt, a tension set up in the mind itself, against which it could not but revolt. The saying of King Alphonso, that, "If God had consulted him at the creation, the universe should have been on a better and simpler plan," is well known; and Copernicus's own words prove the

same fact. He was dissatisfied, he says, in his Address to the Pope, with the want of symmetry in the existing theory, and weary of the uncertainty of the mathematical traditions. He sought accordingly through the writings of the ancients if he could find any better plan, and was fascinated with the idea of the central position of the sun. "Then [illegible] editate concerning the motion of the [illegible] it appeared an absurd opinion, yet [illegible] previous times others had been allowed [illegible] feigning what circles they chose in order [illegible] the phenomena, I conceived that I also [illegible] the liberty of trying whether, on the [illegible] earth's motion, it was possible to find better [illegible] than the ancient ones of the revolutions of the celestial orbs." The true interpretation is brought about by the strain which the false idea, when carried out to its results, imposes on the mind. The process is as clear and as easily understood as the similar one in mechanics which it so immediately suggests, and one of the most striking instances of which Shelley has made his stepping-stone.

But from this point of view a further analogy presents itself. Talent and genius, thus related, exhibit the same phenomena as the life of our own bodies. The physical and the mental life, so far, are strictly parallel. The actions of the living body are referable to the same laws of force that we thus trace in mind. A power gradually accumulated and suffered to come into sudden play—this is the view which Science presents of the activities of animal life. There is a tension in the animal body which fits it for its actions, just as there is a tension in the mind which prepares for the revelations of genius. The mind grows and acts alternately, as the body does. This very illustration, the accumulation and fall of snow upon

the mountain's side, has been used to elucidate the connection of events in our bodily perceptions—to explain the accumulation and operation of the nervous susceptibility.

The very same ideas, therefore, which Science finds appropriate to the life of the physical organic kingdom are found appropriate to the life of the mind. From some aspects, the phenomena of both are capable of expression in the same terms, and a point of unity is grasped between them, the reality of which is vouched for by the instinctive division which is made of our mental operations under the terms "talent" and "genius." It is, in truth, an organic world on which we look within us, and in which our own poor thoughts are included and built up.

It would be easy to multiply instances of a similar relation of true and false thoughts in respect to almost every branch of knowledge. The establishment of the circulation of the blood, of the chemical doctrine of combustion, of the main facts of geology, among others, would afford striking examples. But there are few other cases in which the facts are equally familiar, and therefore equally appropriate for illustration. It is enough to refer to the general proof which is furnished by that almost universal occurrence of false ideas before true ones, which is evident upon the face of human history. The one instance given may suffice, if not to prove the doctrine, at least to render it intelligible, and to place it fairly before the reader's judgment.

And is not the idea beautiful? Is genius made any the less glorious or attractive by being regarded, not as a mysterious power, but as a necessary resultant of preceding energies? See how the very imperfection of our powers, the disabilities under which a creature limited as man is inevitably labours, are thus turned to account, and

made to mi ster in a chain of mutual services. Out of our very shortcomings a life is made to spring. Surely, no better law for our mental structure could be planned than this, which, from so small a starting-point of partial apprehension and mistaken view, educes results so grand, and from a basis necessarily so limited gives to knowledge so wide a sweep. Of wo rformance in the past, is it not of still richer pro he future? And in its simplicity, too, not less ad an in its results? Two different orders of mind m erate in man's progress, to carry out respectively tages of which it consists. Power, activity, laboriously employed skill, are needed, on the , to make the observations, to construct the arti. tem, and bring out the hidden insufficiency of the native thought; on the other hand, there is needed—not power, nor skill, nor energy, nor toil—but sensibility; a special organisation, a capacity not of acting, but of feeling. In the one case we want power, in the other a channel; for the work of talent is a doing; of genius a suffering to be done.

Seeing the necessity of this twofold process in human progress, we cannot but admire the persistency with which the distinction between these two modes of mental operation has been maintained in the common opinion and language of men, and this in spite of the difficulty there has been found in defining it, and the frequent attempts that have been made to deny it, and to resolve genius into a special form or special application of talent. Here, as is so frequently the case, men's words have many times been truer than their thoughts, and the unreasoning assertion of a natural conviction has preceded a rational comprehension of its basis. But we can understand also, how, without a perception of the true relation of talent to genius, there have come doubt and obscurity over the

whole subject. The mind is naturally intolerant, and rightly so, of special and unaccountable entities, whether in the shape of things or faculties, and seeks irrepressibly to reduce the unfamiliar to forms of the better known. Thus it has come, for instance, that the term "genius" has been applied sometimes to the more imaginative and artistic minds—has been made synonymous with the gift of poetry, or music, or painting, with which it has no more special relation than with any other branch of human activity. These display the mutually subservient operation of talent and genius as clearly and as decisively as Science itself. There are poets, and painters, and musicians, and these among the greatest, who, we feel, are men of talent, as well as others, in whom, as soon as we look on them or listen to them, we recognise what is called the magic fire of genius. It is not in the direction of men's faculties, but in the mode in which they operate, that the characters of genius are to be sought. But on these characters, as displayed in other fields than that of intellectual progress, the present writer, lest he betray his ignorance (not being learned in art), will not venture here to speak. If the idea be once fairly grasped, no difficulty can arise in testing it on every field.

Genius has been confounded, too, with simple greatness; every man of remarkable power being called a man of genius merely to indicate his eminence. This error, though it is accounted for by the fact that the work which is done through men of genius is incomparably the greatest that is done at all, involves, notwithstanding, the very utmost falsity. So far from genius being greatness, and indicating power, it is emphatically the reverse. The men of talent are the men of power; they are the strong. The affinities of genius are with weakness. His faculty is that he opposes no obstacles; that his strength is taken out

of the way, and Nature operates through him. The truth is "loosened" in his mind, and falls; but it falls by its own weight, not by his energy. He may have great powers; if he does a great work most probably he has, but they are of subordinate place. What distinguishes a man of genius is not certain tendencies and powers, than similar ones. He is without that strong perception, and that consequent strong sense-faculty, which is so common as more properly intellectual powers and assert their full authority. The man to see or do that which all men can easily do after him; the difficulty being not in the doing, but in being the first. For which prerogative there is demanded not a stronger power, but a weaker impression from accustomed views, a loosening of the grasp which appearances lay upon the soul. As colour-blind men (it is said) make the best engravers, because to them, being non-percipient of colour, the relations of light and shade are unobscured, so it is with the "insight" of genius. There is a special vision by virtue of a special blindness.

We can easily see, for example, what sort of a man Copernicus must have been; what mental characteristics determined him to be the person in whose mind astronomy *righted itself*. He must have been a man in whom the sensuous impressions were weak, in whom the natural impressions, which gave birth to irremovable convictions in most other men, weighed very little in comparison with the demands of the intellect for order and simplicity. If a moving body had been pointed out to him, and it had been said, "See how fast it moves!" we can imagine him replying, "It seems so." Copernicus might have been—I do not doubt he was—a man of strong reasoning

powers; but the mere fact of his achievement does not prove him to have been so. What distinguished him from other men was not the strength of his reason, but the weakness of his sense impressions, which left his reason free to play; as, thanks to him, all men's has become on this subject since his day. He destroyed for us the bondage of sense, because he himself was free from it; for our very faculties also are our prisons. It is ever so. The genius of one age is the common sense of the next.

But though genius is neither greatness nor strength, but has its root in weakness rather, yet we see quite well why it is that it bears the fruits—the chief fruits—of greatness. It must do so for the very reason that it is a weakness, and not a strength; an emptiness, and not a fulness; a channel, and not a force. It is a channel through which the concentrated energies of mankind are poured; an emptiness which Nature's self condescends to fill; a weakness that enlists on its behalf the power on which the world reposes. Well is its work called an "inspiration;" humanity speaks in its voice; humanity, and therefore Deity. The truth of that commonly false saying, "Vox populi, vox Dei," is found here. It is the voice of man that genius utters, the strength of man it wields. The power which is embodied in its achievements is the accumulated power of long generations, it may be of long centuries, of workers; they have laboured, genius enters in and reaps.

And thus the work of genius seems often to be of even superhuman power, to bear no relation to the capacities of the individual worker, or to any capacities, indeed, that can be conceived as dwelling in a man. This it is, in part, that gives to genius its mysterious character; the unaccountable, almost abnormal force which it displays.

But the force loses this character of excess when we regard it from the right point of view—the human, not the individual. Referred to the man who seems to exert it, the power displayed in a great work of genius is a miracle; referred to the human race, it is moderate and natural. The force of inn e minds comes into play in one who offers to it a assage, and we exclaim, "Behold a prodigy!" A arvel the more, because so often we can find in himself nothing to account for, or even propo to, the amazing power. It is as if we ascribed th hich elevates a fountain to the immediate pipe fr it issues. We do not look behind and note the flood.

There is no ground for pride in genius; it is a privilege which may well make humble; not a possession which might puff up. The man of genius is the servant of the human race, privileged to wait on all its workers, gathering up even the fragments that nothing may be lost. Greatest of all, because the servant of all. Nor, indeed, are men of genius proud; a wise instinct in their heart teaches them better. Unconscious of the true source of their power in the labours of other men, they have yet felt that it was not theirs. Hence those frequent disclaimers, that we have referred to before, of the possession of any peculiar powers. They are not conscious of any; often, indeed, they are sure that they have none. But if wrongly put ideas will right themselves in their minds, how can they help it?

If they could help being punished for it, that were something—punished with incredulity, with scorn, with bitter blame; in days less polished and more in earnest than our own, with cruel stripes and flames; in our own days—but perhaps we are better than our fathers. Yet

who has held the balance for us between being quickly burnt or slowly starved?

This, however, we may say, in our own and their excuse, that it was very hard for us, or for them, to have been called upon to receive what genius had to tell, not understanding what its place and mission were. Thinking that man's labours run, or should run, in the true line of his advance, how could men admit without long struggles ideas which revolutionised them all? Judging that a man's possible achievements were to be estimated by his own proper powers, how could they consent to receive from him as true that which palpably transcended the capacity of men? Peace be to the ashes of persecutor and persecuted man alike! Both thought, and both still think, to do God service; and we will reverence the incredulity as well as the revelation. How should the world forego its martyrs—by fagot or by famine?

RECOLLECTIONS.

The following Papers, contributed from various sources, have been written in each case from the recollection of one or of several conversations.

XIX.

AN ANALOGY OF THE MORAL AND INTELLECTUAL LIFE OF MAN.

WHAT history records is the becoming of man's life, intellectual and moral. The process of the making of his knowledge is precisely analogous to that of the creation or development of his moral life. As man's progress is from ignorance to knowledge, he must, of course, in all his investigations, start from a negative condition, and the ignorance which is at the basis, and affects the premiss from which he sets out, will influence every step of the process; and express itself most forcibly in his conclusions. Starting thus, man proceeds to acquire knowledge by means of observation, the result of which he arranges on hypotheses, which are for the most part the guesses of ignorance. It is evident, therefore, that however logical the deductions he makes, and however correct his observations, he will inevitably be led further and further from the truth. This process continues until he has arrived at conclusions so repugnant to reason, that the common sense of humanity, expressed in the person of some man whom nature creates for this special function, rejects them, and in so doing overthrows the premiss which was linked to these conclusions, and rectifies the starting-point by filling up the negation contained in it.

This is the way in which all advance in knowledge is made, and it is perhaps best seen in the history of astronomy. Ignorance of the earth's motion (due to the sense-impression of stability) was here the negation in the premiss. With this false thought modifying all his reasonings, man proceeded [illegible] his astronomy by careful and accurate observation [illegible] heavens. The result was the hypotheses of the Pt [illegible] system. The epicycles will for ever remain as a [illegible]ment of the triumph of human skill; they were an [illegible]lent piece of intellectual work: none the less bec[illegible]ey became at length so complicated and involved [illegible]very fresh motion discovered had to be account[illegible]by a fresh epicycle) that at length man (in the person of Copernicus) threw off the yoke of the conclusion, and in so doing cast out the negation in the premiss—viz., ignorance of the earth's motion. Herein consisted the very excellence of the epicycle astronomy, that by its inexorable logic it so linked the false conclusion with the false premiss, that the rejection of the one involved the rejection of the other: it established, as it were, a dynamic connection between them; so that the force set free by the shaking off the thraldom of the epicycles was available to bring about a belief in the earth's motion. For observe what this force was which had been stored up under the pressure of the Ptolemaic system: it was the resistance of the intellect to the rule of sense. The epicycles were, in fact, an affirmation of the validity of the sense-impression. Reason was at work, indeed, in the making of that system, but she was at work in chains. All her activity was limited by the authority of the sense, which affirmed the stability of the earth. She might speculate, she might invent; but she must obey. In early days she had, indeed, with the hardihood of a child, set that

authority at defiance (Pythagoras is said to have affirmed the motion of the earth), but she was not yet fit for liberty. She had to enter the house of bondage, and gather through centuries of repression the force which was at length to issue in a glorious emancipation. For the triumph of Copernicus was not the mere discovery of the fact of the terrestrial motion, it was the announcement therein made that the tyranny of sense over reason was for ever at an end: he broke the yoke and bade the oppressed intellect go free. And let it be observed, that this deliverance was effected, not for the learned only, who had trodden the toilsome path of the old astronomy, but for the whole human intelligence. The toil had been vicarious, the results were freely communicated to all; only a small fraction of the human intellect was capable of threading the intricacies of the Ptolemaic system, but it was probably easy for the children of the next generation to learn that the earth moved—so easy that we might perhaps think no gain had been effected for them, but in reality the gain was incalculable. They had not to break the yoke, they had never come under it. "With a great sum obtained I this freedom," boasts the emancipated philosopher of the Old World. "But I was born free," rejoins the child of the modern age.

But the paramount value of this chapter in the history of human thought lies in the key that it furnishes to the development of man's moral life. That, too, may be said to grow by a process analogous to that of the *reductio ad absurdum*. Man is made conscious of the ignorance, the "blindness," that is in him by the necessity he is under of working it out in the actions of his life; when the results of this working have become intolerable evils to him, he finds there is no way for him

to free himself from them but by rectifying the basis of his life and starting afresh.

To trace this process more definitely; as in the making of knowledge, so in the "becoming" of life man starts with a negation latent in his consciousness. Here, in the moral world, the "self" corresponding to the sense in the ual. It would be no more true to say that at od man's life expressed nothing but the rule of n it would be to affirm that in the pre-scientific his intellect was completely subordinated to pressions; and yet we have seen that the free f reason was, in fact, prevented by the autho ıe senses; and in the same way the "self" controu.. uly human powers, and will continue to do so until it is dethroned as Copernicus dethroned the sense. Whether this is possible is *the* question which, above all others, it interests humanity to have answered. As we turn heart-sick from one failure to another of experiments, social, political, benevolent, religious, directed to getting crooked natures to live straight, and observe that all fail through *one* cause, however variously it may work, viz., the selfishness of man,[1] we ask, Is it possible to cast out this self, this unreasonable tormentor of humanity, that alone prevents us from living a truly human life—a life to which nature points as the only possible blessedness, in a world where everything is created for mutual service, and has its being only in giving—a world in which science in

[1] It will be well to bear in mind that when the "self" is spoken of in Mr. Hinton's writings, a negation, not a positive existence, is meant. Self regard is an absence of regard to some of the circumstances that have a claim upon our emotional consciousness. This will make the astronomical analogy the closer. For there it is an ignorance, an absence of knowledge, that is the cause of the false opinion, as here it is the defective emotional apprehension that is the cause of the wrong action. (See Essay on "The Bases of Morals.")

her latest revelation of the correlation of forces seems to echo in another tongue the words of Him who said, "He that loseth his life shall save it unto life eternal"? How glad would be the discovery if we could find, not only that there was a hope of the "self" being cast out of man's life, but that all human history has existed for this very purpose, and that every event in that history has been a necessary part of the process! How joyful, too, if it should appear that this process were near its termination, that the Kingdom of Heaven was "at hand!"[1] The signs of the times can only be read in the light of a parallel experience in another department of man's life, and the more closely we follow up this parallel, the more does the certainty of the issue impress itself upon our convictions. It seems impossible that, after having exhibited the closest resemblance in every feature of their course, the intellectual and moral life of humanity should diverge at this crisis, that the intellect

[1] It must not be supposed from this and similar passages that Mr. Hinton entertained extravagant hopes of a sudden change to be brought about in human life, still less of any violent external revolution. If the intensity of his convictions and the clearness of his spiritual vision made the distant view seem near to him, he did not ignore the intervening space of years that must elapse before his prophecy would be fulfilled. He expected that it would take about six generations or two hundred years for the thought of "right," as determined by "service," to leaven the world. For this he trusted simply to the ordinary agency by which every truth by degrees permeates society: a small but increasing number of men in each generation would adopt the idea, and cause their children to be guided into the new moral path, which, being easy to tread, though hard to find, would never again be abandoned for the old one. Mr. Hinton did not hope for anything more than that the altruistic idea of right would influence men's actions as widely as does the existing idea, but this, he said, would transform the world. He did not overlook the fact that men's actions are determined by other causes besides the prevalent theory of morals, but this last it was that he chiefly strove to correct, and hoped in so doing, if not to create a new motive power, at least to effect such a redistribution of it through new channels that the moral and social life of man should be to an incalculable extent raised and purified, set free from the artificial badness which now disfigures it.

should cast off its shackles, but the heart remain in bondage.

But to our parallel. Man starts, then, on his course of "becoming" with a self-regard in the basis of his life; this is the negation, the ignorance which Nature is to drive him ultimately to cast out. This she does by a process analogous to that [illegible]aking of knowledge by a *reductio ad absurdum*. [illegible]made to work out the problem of trying to live [illegible]self-basis to its bitter end, and having tried all [illegible]ivable ways of doing the impossible, he is to [illegible]ght to cast out this self, the negation in his p[illegible]nd live, "Nature-wise," an altruistic life. His ac[illegible]then be related to the being of Nature as Science is [illegible]related to its phenomenon. Let us trace his course towards this goal.

We may roughly divide men into two classes—those who seek goodness, and those who simply seek pleasure and live to gratify their inclinations. It will not be denied that there have been in all times men who cared for rightness, and that this passion, though never so widely spread as that for pleasure, has shown itself—witness the annals of asceticism—under all religions and amongst various races, capable of sustaining the most gigantic efforts, and of overmastering every other passion of human nature. These two classes of men have one thing in common—they start from a self-basis; they pursue a different course, the one tending to vicious excess, to lawless indulgence, the other to self-torturing asceticism, to a cruel enforcement of rigid laws; they seem wide as the poles apart, each denounces the other. What keeps them asunder? Their one point of agreement, self-regard. The self-pleasing and the self-righteous man can never be reconciled but by casting out the self; then "out of twain is made one new man."

One cannot help being reminded here of the Pauline idea, destined to receive an ampler fulfilment than any as yet witnessed, of the union of Jew and Gentile in the new humanity revealed by Christ. The law-regarding Jew is to be *self*-righteous no longer, but is to find all law-keeping summed up in the one new command to "love one another;" the passion-led, pleasure-loving Gentile is to be brought under the law to Christ, but it is on his heart that the law is written; he indulges a "passion," though he is no longer "self" indulgent.

These two classes are paralleled in the intellectual sphere: the ignorant, who follow blindly the impressions of sense or the natural affirmations of reason, correspond to the "pleasure-led;" the makers of the epicycle astronomy, those who frame an "observation-true" science, are like the "self-virtuous." This latter intellectual class may be composed of men of the highest endowments and filled with a zeal for truth, but they are like the ignorant in one point, that (in the old instance) their non-perception of the earth's motion ruled their conclusion, forced their reason to make a sort of virtue of doing that which was repugnant to its instincts. The careful study of the appearance imposed on the man with the false thought in his premiss the necessity of believing a false theory—a wrong thing became his "duty." Just so with the "self-virtuous" man. Nature's only "right" is in the mutual service of all creatures, and the only fulfiller of this right is that "Love that makes Duty one with Delight." But he in whom this love is not, who strives to be good *for himself*, will be driven to find some other measure and standard of right than service: he will make it to consist in the abnegation of pleasure.[1] This is asceticism,

1 For further explanation how a self-regard in the beginning imposes false duties upon the conscience, the reader is referred to the Essays on "The Bases of Morals" and on "Others' Needs," in this volume.

a goodness held to be antagonistic to the natural desires. The ascetic ages are marked by a tendency to multiply the number of duties and restraints upon natural passion far beyond the demands of utility and practical benevolence. The perfect rule of service renders a certain amount of pleasure-restraint necessary. But even here it is by a higher pleasure that the [illegible] imposed), but where restraint is held to be a [illegible]ng in itself, a number of artificial duties will be e[illegible]which are often directly opposed to service. This [illegible]lication of burdensome duties answers in the int[illegible]l parallel to the complicated system of epicyc[illegible]h it was impossible to a "good" intellect to rejec[illegible]g as the earth's motion was ignored. The self-righ[illegible]o the moral what the "observation-true" is to the intellectual process. There is the same repression in both—of passion in one, of the free play of reason in the other. And just as in the "*reductio ad absurdum*" process, the force was being gathered and collected (under repression) by which the false conclusions, and through them the false premiss, were to be thrown off, and thus the tyranny of the senses broken; so in asceticism, which is a *reductio ad absurdum* of the self-life, the force was being stored up by which the casting out of self is to be effected. Asceticism had to be broken up that a true nature-goodness might take its place. Nature has linked together pleasure and service; the self dissociates them, and in trying to follow either alone, it ensures its own destruction in the end. "O Death, I will be thy destruction." No goodness that is not happy[1] is good enough for God. Man offers Him his difficult virtues, his mortified body and stifled affections, as an acceptable sacrifice; but God answers, "Who hath required this at your hands?" But though

[1] *i.e.*, Passion-led.

this goodness is found wanting, and asceticism has to pass away, it has done its work of slaying the self.

The triumphs of self-restraint and abnegation have not been wasted any more than were the intellectual virtues of the Ptolemaic astronomers. Self did indeed vitiate the goodness of the ascetics, since it made them enforce mischievous laws, and cherish their own saintship to the neglect of social claims (just as the sense-rule perverted the results of the best observation and logic of the astronomers to a false conclusion), yet the power of living an altruistic life was asserted in their perverted goodness, and becomes to us a prophecy of possible achievement. If man could perform such prodigies when striving against Nature, what may he not accomplish when he is working with her? Even apart from this consideration, so attractive, in some of its aspects, is the ascetic life to us who groan under an imposed rule of self-regarding luxury, stifling our best emotions, that we wonder sometimes why it could not endure, and are disposed to think that the phase into which man's moral life has since passed is a retrogression rather than an advance. The prevalence of this feeling meets us in a variety of forms—in sentimental sighings after the martyr's crown or the virgin's wreath; in the exaltation of the Cross as the sole symbol of our aspirations (while it recedes further and further from the sphere of our practical life); in the revival, among the Ritualists and elsewhere, of mediæval ascetic practices. Christendom, or at least the most faithful and loving portion of it, is still exploring the empty tomb and reverentially handling the folded grave-clothes, while an angel unheeded proclaims to ears too sad to listen, "He is not here, but He is risen; why seek ye the Living among the dead? Christ could not be holden any longer by the bonds of death, because He was to open the gates of

heaven to *all believers.*" And this is why the grave of asceticism could no longer hold the spirit which for love's sake had so willingly descended into it. His life, like His death, was for others. "To this end He both died and rose and revived—that He might be Lord of the dead and of the living." And the Church, His body, wore for a time the fetter of a restraining law, that she might throw open the door of a freer, nobler life to the "Gentiles"—the unrestrained pleasure-seekers (or pleasure slaves), who, though capable of virtue as long as it meant legal restriction and arbitrary denials of nature, might enter into the kingdom where love was at once the impelling and the restraining power. This brings us back to the parallel of the epicycles—[indeed, it requires a positive holding back of the pen to avoid speaking of one in the terms of the other. As I write, three things are before me at once—the life of Jesus as it was transacted on this earth eighteen centuries ago; the moral life of man or the Church (divesting that term of any associations which limit it to a particular set of persons arrogating to themselves an exclusive title to it); and the development of the human intellect by the creation of science; and these three are one]. For we saw just now that the laborious construction of the Ptolemaic astronomy, undertaken by a small fraction only of the race, issued in a discovery of truth which could be imparted to all, and, more than that, in an emancipation of the reason for all unborn generations. So was it also with the subjection of the moral nature to a false law by asceticism: and the issue is the same; that deliverance is made possible for a much larger portion of mankind than could ever have been induced to go through the process. How plain this is in the New Testament, where the Gentiles are represented as pressing into the

Kingdom of God, opened to them by the abolition of the Jewish law contained in ordinances, to which they could never have subjected themselves! And yet, be it remembered, here too "salvation is *of the Jews*." It was wrought out by one "born under the law;" it was "through death" that He "overcame the power of death." How ready we are to load the envious Jews of that time with opprobrious epithets, because they grudged the Gentiles so easy a way of salvation, could not bear to think their own painful law-keeping, their tithe-paying, and Sabbath observance secured them no immunity from the common necessity of owing all to grace, and gave them no position of pre-eminence in the new kingdom. How we sympathise with the generous indignation of Paul, who considers all his former gain as loss that he may preach to the Gentiles the unsearchable riches of Christ, and is well content to have trodden the difficult path himself that he may open the easy road to others. But it is not so easy to us to see that the same crisis repeats itself in our own day, that our "goodness" has to die to the law, and become passionate, enthusiastic, that it may be possible to the "Gentiles" of the present day, those who cannot wear the legal yoke, but who are as capable as we—nay, it may be more capable than we—of the sacrifice that a life of service requires. Men who cannot obey a law of "things" which rests on a mere conventional basis, and which (as is the case with much of our morality) even requires the crushing of some truly human emotion, may come under the sway of the "love that worketh no ill to his neighbour."

If this change took place (and it seems too good *not* to be true), we should perhaps see at once the explanation and the cure of a phenomenon which has puzzled and distressed all thoughtful Christian observers of the features of this age, namely, that Christianity, as

embodied in the professing Church, does not attract to its side in large numbers its own natural allies, the ardent, the loving, the true, the unconventional, the heroic souls, who, if Christ Himself could speak, would surely hear His voice, for they are His "sheep." These, as a rule, are aliens to nominal Christianity, and the streams of heroic activity [illegible] ier times gained the triumphs of the [illegible] mainly, to swell some irregular dest[illegible] inst organised society. On the other n[illegible] o be denied that our churches are larg[illegible] n who, judged by their own professed theory, a[illegible] bent on "making the best of both worlds," a[illegible] nnot in any sense be said to have adopted th[illegible] tian principle of self-sacrifice, any serious application of which to practical life they would stigmatise as Quixotic. How is it, we say, that the life and teaching of Jesus still being our professed model and guide, we seem to be fighting under a wrong banner, and our host is swelled by those against whose principles we would gladly wage war to the death, whilst in the hostile ranks are those to whom our hearts yearn as to long-lost brothers? Will not this change that we so long for, and to which all things point, bring about an altered state of things? Fight we must; we would not have it otherwise; but at least we shall have some of the healthy joy of combat when we know we are striking the old dragon, *Self*, whose death is the life of humanity, and not aiming cruel blows at those who themselves are at war with the same enemy. There is heroism enough in the world to bring about the social revolution for which we groan, if it were only directed into the right channels.

But this is a digression. To return to our parallel. If asceticism corresponds in all its characteristics to the hypothetical stage which precedes the birth of

a true Science, what shall we say of the present age? Asceticism is past; the true human life for which it was the preparation is not yet come. We seem to be in a muddle—hopeless muddle, I was going to say; but if it were, how should we know it for a muddle at all? Surely a muddle implies a struggle between the organising instinct and the chaos around it, and all our blindly furious tugging at the threads only makes the tangle harder to unravel. We feel somehow we do well to be angry, but against whom or what is not clear. Never surely was there a time when the theory and the practice of life diverged so widely; and, again, our theory is so inconsistent with itself. The whole aim of modern life seems to be to make existence as pleasant as possible, to remove everything that taxes endurance. Science is tasked to make the powers of Nature do all our hard work for us, and to bring to every avenue of sensation the ministers of delight. And yet there is a latent feeling, that betrays itself in a variety of ways, that goodness consists essentially in a restraint of pleasure. The result is, that we habitually lavish extravagant praise upon self-denial, whilst we relegate it to a safe distance from our Christian lives. And even in those cases where there is most of earnest activity for others, of self-sacrificing effort, these are not, with rare exceptions, the basis of the life, but are superadded on a foundation of acting for self, so that the life is a patchwork of incompatible materials. We put, meanwhile, an immense strain upon our emotions, tolerating evils that we feel ought to be utterly intolerable, persuading ourselves that they are part of the necessary order (or disorder) of the universe, whereas they have been introduced by man's mistake, and only exist for the purpose of showing him his error and leading him to rectify it. It seems at first as if the

parallel broke down here: if the work of asceticism is complete, and we have come to the end of the *reductio ad absurdum*, why is not the "self" turned out of our action? We seem, in fact, to have thrown off the conclusion without rectifying the error in our starting-point, and it looks as if the *logic* in the intellectual process which forbids this had no analogue in the moral. But perhaps, if we look a closer, we shall see that even our moral "muddle" parallel. Are we not like one who, having perce absurdity of the conclusion, should, before de premiss, go over the logical process, trying, if p to break the chain that links the two together, ar , in fact, a number of futile attempts to get rid of t... nclusion without giving up the premiss? He has been, it may be, so enamoured of the intellectual work that he has been doing, that he is loth to give it all up and begin again; he does not see (and that is the vital point) that he has all the effect of that work in his new start, that he truly possesses the result of his labours *in letting go;* he wants to hold on, after nature and reason tell him to loosen his grasp, and what but a sad perplexity can ensue? But how should it be permanent? So we persist in holding on to certain ascetic duties which imply restraint from service and bring upon us countless miseries, whilst all the while we are dimly conscious that the force thus held in check is panting for another and a nobler employ. Our practical denial of asceticism implies that we have faced our false conclusion and refused it in our hearts, whilst the fact of our goodness being in it makes us still cling to it with regret. It cannot, in fact, be expelled by a mere *negative* denial. Part of the world is trying to do this—that is the bad side of Protestantism, its easy virtue, its contempt for the foolish austerities of the monks, its contented en-

joyment of the good things of this life while the world is perishing: all this looks and is a far more pitiful thing than asceticism, and cannot be more than a transient phase of human history. Not until the force that was in asceticism has passed into the new altruistic life, not until the restraint is in the heart instead of in the external law, can the power of asceticism to fascinate the imagination and command the obedience of men depart from it. So that here also the parallel holds good. Try as men may, they cannot get rid of the conclusion without denying the premiss. And this is how the very obstinacy of the evils under which we groan gives us a ground of infinite hope. If man could remedy his miseries by a mere readjustment of the social machine, as he is always trying to do, without bringing a new force to bear upon the action, his case would indeed be hopeless, there would be no moral regeneration possible for him. For verily if salvation had been attainable by Acts of Parliament, by Declaration of Rights of Man or Wrongs of Woman, by charitable enterprises, by schemes of Political Economy, by nicest balancings of mutual or opposing interests, by any of the Utopias that it has entered into the heart of man to conceive, he would not now be bound hand and foot waiting for deliverance. But if he is not to lose the pain, keeping the disease, it is because a cure is possible which will cleanse the fountains of his nature, and restore to their right channels the currents of his moral health.

Regarding the moral history of man as a process of *reductio ad absurdum* for the purpose of the correction of the premiss, one sees how the paradox can be affirmed that, on the one hand, the world is perfectly good, so good that nothing could improve it, and that, on the other. it is so bad that nothing could by any possibility

make it worse. These are the characters of a *reductio ad absurdum*; the errors into which it leads you cannot be too gross or revolting to reason, for it is their office to revolt reason. It would be no improvement to the process if these could be palliated; and at the same time the process as a whole is exquisitely beautiful to the intellect. Ignorance could not wish for knowledge to come in any other way.

XX.

THE MORAL LAW.

MOST readers of the New Testament are aware that the founder of the Christian faith gave to His disciples two distinct summaries of His teaching—one at the beginning of His career, the other towards the close of it. The first of them was, "Thou shalt love the Lord thy God with all thy soul, and with all thy mind, and with all thy heart. Thou shalt love thy neighbour as thyself." The other simply, "Love one another."

A glance will suffice to show in what the principal difference between these two consists. All mention of God is omitted in the latter and the love of our neighbour left absolute. We will not here discuss whether this omission was intentional or not, or what other differences there may be between these two commandments. At present we will consider the latter of them alone, and without reference to the former.

Love one another. But to love is by no means easy, and the child Humanity (represented in this case by the would-be followers of Christ), instead of concentrating its whole soul on doing the thing which it was commanded to do, stared helplessly at the great problem before it and shook its head, saying, "No, no; that is impossible.

I am too young yet; my faculties are not developed, my powers are not matured. When I am older, when I am in a different state, *then* I can think about loving; but meantime what shall I do instead?"

What shall I do instead? A fatal question, which presents itself sooner or later to almost all men, which passes away too often leaving behi[illegible]e print of its footsteps in misery and crime. "Let [illegible]t ourselves away from the world and save our own [illegible]aid some. Hence the monastic self-torture. "Le[illegible]out into the world and force it to worship as we [illegible]" said others. Hence religious wars and persecut[illegible] Let us keep ourselves respectable at all costs to [illegible]es and others; let us believe that outward cerem[illegible] purify that which is inwardly defiled; let us respond to the claims of society rather than to the claims of humanity," said others still.

But—need we say it?—all these plans have failed; and the poor child, having assumed at starting that "To love is impossible," finds itself face to face with the fact that *nothing will do instead.*

Now the foregoing is not a history of something which happened once at a given time, but the expression of a process which is continually repeating itself. We to-day are in the midst of it. We to-day are finding out by bitter experience that wanton, suffering our own and others, is of no avail. We are beginning to realise that love *always* and love *only* can purify, and that self-righteousness is not our duty. And we too are continually saying, "I cannot love; *what shall I do instead?*"

It is with reference to one of these substitutes for the true law that I wish now to speak, viz., the following:—"Love your neighbour, or at least, *act as if you did.*"

Here there are two fundamental errors. In the first place, this precept contains an impossibility; for the action which results from "loving" must be essentially different from the action which results from "not loving." A person who did not love *could* not act like a person who loved (unless he possessed an almost superhuman genius for representation and great experience). Secondly, for unlove to imitate love's action, even were it possible, would be of no value whatever, in a moral point of view.

A moment's reflection will suffice to make this clear. The moral law is "Love thy neighbour" (every serious thinker, whether he does or does not accept the theological doctrines of Christianity, acknowledges this). The duty which we owe to our neighbour is "to love him;" not loving him, we cannot do our duty by him. And to any one who asks, "I do not love my neighbour; what shall I do?" there can be but one answer, "Love him."

We can imagine an objector saying, "This assertion is ridiculous. Of course if man were in a perfect state he could love his neighbour. Being as he is, he must do the next best thing, which is—act as if he did. Do you mean to imply that supposing I owe my neighbour some money, I need not pay it to him unless I love him? Is it not my duty to be honest *whatever* my own feelings may be? If people saw no reason for paying their debts, what a chaos society would become!"

"Very true," we should make answer. "Under such circumstances society would become a chaos; but the circumstances never could exist, for society would organise itself according to its own convenience. People would find it impossible to retain their social position without

paying their debts, and *therefore* they would pay them. Do not think that moral force is required to make people honest. As a matter of fact, the most scrupulously honest people often are so because their own welfare depends upon other people's being able to trust them. That business relationships should be kept inviolate is by no means valueless; s valueless *in a moral point of view*, a mere of policy outside the domain of morals altogeth

But our imaginary ob not yet satisfied. Let him speak for himself. it you that the moral law, in its perfect fulfil To Love; but I cannot rid myself of the convic am morally responsible for my actions as well as motions. To do to all men as I would they should do unto me, whether I love them or not, is not a 'mere matter of policy;' it is a moral duty, less exalted perhaps than the moral duty of love, but nevertheless of great value *in a moral point of view*."

We should reply, that the moral value that belongs to that action belongs to it as a means and not as an end, belongs to it only in so far as the action tends to produce the feeling of love.

We have admitted that the moral duty of love is the highest of all. If that duty were fulfilled indeed, there would be no need of any other. All others would be fulfilled in it. Seeing, then, that to do *anything* involves expenditure of force, were not the moral force of humanity more profitably expended in loving than in any other way?

And love may be likened to a plant which requires to be watered. Wasting our moral force upon *things to be done instead*, is like driving a stick into the ground at a

little distance from the plant, and watering the stick. Would that make the plant grow?

Here, then, is the answer to the question. No end can be attained without means to that end; and the greater the end, the wider, the more numerous the means to it. To sow, to build, to manufacture, require labour both in their accomplishment and in the process of acquiring them. If you wish to become a musician, the means widen almost to infinity; they vary for every individual; they cannot be stated in words. Musicianship is rather a *state of the soul* which grows from employing all the means that a life can lay hold of. And love also is a condition of the soul. We might say, 'Love your neighbour; and, as a means to loving him, try to act as if you did." But even that would be imperfect, for the means to loving are infinite. What are they then? *Everything*—all that surrounds our existence, whether within us or without. Acting as if you loved your neighbour, in so far as that is possible, is at least *one* of the means to loving him,—invaluable, but not to be laid an undue stress upon, lest men should mistake it for an end—invaluable in *a moral point of view*, if we use it as a means only, remembering that it is one amidst very many.

And one more question suggests itself. Is it possible for men to love? On the other hand, Is it possible for men not to love?

Look what experience teaches. Of old, men's love for God lay crushed beneath the pressure of ceremonial duties which they thought they owed to Him. Because and inasmuch as we (through Christ) have swept all these away and given back to love its rightful throne, our hearts, which they had usurped—in so far as we have done this (if the rest is equal) our love exceeds the love of bygone ages.

Let man lay hold upon the moral law—*the* moral law we call it, because there is no other, because all others lie beyond the domain of morals altogether; and let every individual find the means to obey it in all the facts that surround his existence.

XXI.

WHAT WE CAN KNOW.[1]

1868.

It is a common fact of experience that our senses give us only appearances of things, which appearances differ from the things themselves in many important points. Our impressions are determined or modified by subjective elements which may be either positive or negative. For instance, we see light and colour which have no existence apart from the eye that sees, because it is the nature of our vision to be thus affected by certain vibrations of an ethereal fluid; here our impressions are *positively* modified.

Again, we see objects smaller as they recede into the distance; here our perceptions undergo a negative modification. Or again, a morbid condition of the subject may introduce a further subjective element into his consciousness, and cause the world to appear other than it is. Thus to the blind man the world is dark. If all men were blind they would probably never discover that there was anything amiss in their condition.

It is necessary for those so affected that their condition and the truth of things which it conceals from them should be "revealed" by some being not suffering from the same defect.

[1] The following are notes of the lecture referred to p. 229 of "Life and Letters of James Hinton."

The word "appearance" is not to be limited to the impressions made upon sight. All our senses present objects to us under similar subjective modifications. We are naturally inclined to conceive of the sense of touch as presenting to us a truer idea of Nature than the others, but the fact is that in none of the senses is there a larger admixture of subjective ele- s, for in touch we are conscious of putting forth , and it is the resistance to this pushing and pulli urs which gives us the notion of solidity. It is see that touch, no more than sight, gives us the tru ure of objects. Water, for instance, is constantly e ating into air, and thus becoming impalpable to to Touch would thus tell us that water had ceased to when it was really there under a changed form. If man had no faculties but the senses, these "appearances" of the physical world would be to him the sole realities, and he would probably be haunted by no misgivings respecting their actual existence. But he has another power—intellect—by means of which he can derive accurate knowledge from the inaccurate testimony of the senses. It is the function of the intellect to interpret the appearance of things, though it is true that man did not at first put his intellect to this use.

The Greek philosophers, who of all men might be supposed most capable of discovering the province of the intellect (if the world had been ripe for the discovery), distinctly taught that the physical world was not according to reason; it was, in fact, an absurd world; and Socrates dissuaded his disciples from the study of material phenomena on this ground, bidding them turn their attention rather to Ethics and the improvement of social life. The beginning and ending of things was the great puzzle to them. Reason refused to justify such an existence: it

demanded the αἰώνιος, the Eternal. Plato and others therefore imagined their "intelligible world" to satisfy the demands of the reason, using their intellect to speculate instead of to judge. The application of intellect to its true function of interpreting appearances has been the work of Science. When once it became accepted as a truth that the *fact* of Nature was according to reason, the dicta of Reason came to have an objective validity, and if any phenomenon seemed to contradict them, it was set down *therefore* as an appearance merely. The appearance *might* be unreasonable, the *fact* could not be. But observe, the intellect did not go forth ready-made to its work—it was, as it were, created in doing this very work. (This has its parallel in the animal structure, the organs do not precede the functions, but are made, so to speak, in the discharge of those functions.) The work of Science has in our day obtained a completeness which is attested by the convergence of its various branches of investigation in the doctrine of the "Correlation of the forces." And now, in its maturity, Science repeats on a higher octave of experience the truth with which it set out, "We do not yet know the true existence." To the last residuum of scientific analyses, there still remain subjective elements which have reduced the whole physical world—the cause of such manifold sensations—to mere matter and motion. But in these there are the subjective constituents of space and time, which have been proved to have no objective existence.

Again, force is a conception altogether based upon our sensation of exertion, and can no more be proved to exist in Nature apart from ourselves than luminousness could. The conception of nature as matter and force is in fact but an indorsement by the intellect of the sensuous impressions of touch which (*ut supra*) of all the

senses introduces most of the subjective elements. We are thus brought to the conclusion that this world of "phenomena" is no more the actual existence than was that other world of "appearances."

At this point the question meets us, Can we know the true existence or are we shut up to the study of these phenomena? [illegible] nkers (of which Comte is the repres[illegible] d Lewes in England) assure us that [illegible] our attainable knowledge, assigning [illegible] eir answer that there are subjective elem[illegible] phenomena; that we cannot transcend our ow[illegible] sness.

Now I affirm that we [illegible] cend this phenomenal knowledge; that we can e[illegible] ts subjective elements; and that so far from this process being strange in our experience, it is the very means by which all intellectual progress has been made. We are, in fact, only required to repeat with regard to the intellect that which has been accomplished with the senses. Observe that our power to transcend any impression depends upon our possession of some other faculty by which that impression is interpreted. Had we been destitute of intellect, we should have been shut up to the impression of sense, but then, probably, we should never have felt the need of getting beyond them. They were felt to be unsatisfactory and imperfect only because man had within him the latent power of transcending them.

This parallel suggests the *à priori* probability that we possess some faculty that stands to the intellect in the same relation that the intellect does to the senses, since the need has been felt of "transcending" the knowledge gained by the intellect. This discovery that the world which science reveals is but phenomenal would probably never have been made if we had not some powers which

relate us to the true being of Nature. These powers are the moral faculties. We have used the intellect and the moral faculties apart from each other, as the Greeks used the intellect and the senses, transferring the *rightness* which we fail to find in this world to a "heaven" which corresponds to the "intelligible" world of the ancient philosophers.

Let us consider what is implied in the doctrine that our intellect presents to us only phenomena. If that which we think of when we think, in the best way we can, of the things around us, does not correspond with that which truly exists, then there is *not* this book which I hold, this floor on which I stand—but some other existence *is*, differing from them as the appearance of a book to the eye differs from the book itself. This difference is due to certain elements which our own consciousness introduces into the phenomena. The intellect presents the world to us as inert, dead matter; but that which acts upon us and is the cause of our experience cannot be inert. Inertness is the characteristic of the phenomenon; the true existence, which is spiritual, must *act*. The reason why that which is active appears to us under the form of a passive necessity is a morbid condition of man whereby negative elements are introduced into his consciousness. It is from his own defect of life that the living world becomes to him dead matter. This condition, affecting as it does the whole of humanity, could not have been detected had it not been revealed to man. Recognising the true existence, then, as spiritual, we see that it must and can only be apprehended by the moral faculties.

But those moral faculties have themselves to be trained and developed, as in the parallel case of the intellect; they do not come ready-made for the work, but are per-

fected by that very work. Thus trained, it will be found that their judgments have an objective validity like those of the intellect, but of higher worth. But although they have to be trained, they will not be transformed; and as the ancient geometry was found to be the key to the processes of Nature, although it was founded on supra-sensuous conceptions—for the line, point, and plane are inapprehensible to the sense but easily conceived by the intellect—so it will be in conduct. Actions paradoxical to the intellect but clear to the moral sense that the key to the world of thought will be found. Right is, in fact, the true test of existence. If a thing *is*, it is right; if it is wrong, it may on that very account be proved not to *be*, but only to appear.

I affirm that *this* is the world on which the moral sense is to exercise its functions, here or nowhere shall we find rightness. If we shut our eyes on that which *is*, and construct for ourselves some ideal heaven to satisfy the craving of our moral nature, we are making impossible to ourselves all true interpretations of the facts of human life; just as the belief in the "intelligible world," as long as it lasted, made it impossible to find Nature intelligible. We have to "submit ourselves to the righteousness of God" in this sense, not to go about and invent a righteousness for ourselves.

One thing appears to be done in human experience; something quite different is being truly effected. We do wrong; yes, but wrong is not done. The wrong goes as deep as our own consciousness, deep enough for responsibility, repentance, punishment, forgiveness, and all the experiences that come out of sin, but not deep enough to stain indelibly the fair work of God. Does not the inmost heart demand this satisfaction, "Yea, let God be true and every man a liar"?

Is not this the true work and privilege of faith, to lay hold on that *within* the veil, to be emancipated from the thraldom of the appearance through the revelation of the eternal fact?

In looking at pictures, I ticed this, that there are three ways of painting is a way which is bad, atrociously bad—of wh are in many places a great deal too many specim— —where the drawing has no accurate resemblance to the objects intended to be delineated. There is another way of drawing, of painting, in which the things put down are very accurately delineated. There is a third way of drawing, in which, if you regard the general impression, the general likeness to the objects much more reminds you of the first than of the second class; but it is altogether a different thing. Yet it would be very difficult indeed for a person without some knowledge of the subject to say why it was different. The objects presented are certainly not more accurately delineated than in the first class of pictures; indeed, in many specimens of the third class the resemblance is more grossly defied than in any bad picture that ever was painted. Now the first of these pictures are bad, and the last class are good; that is, the sense of the competent part of mankind pronounces them good; they give us pleasure, they affect us with a decided sense of being true, although they do absolutely embody an intense and extreme degree of untruth of a certain kind. And between them stands the other class.

in which the delineation of the objects is made in a manner somewhat approaching to perfection—certainly to a degree quite wonderful and even incredible, if proof were not given of the ability of the human hand to attain it. The question which everybody who gets an impression of that kind would do well to ask himself is this: Is this second class of pictures good or bad? If good, why are others better? If not good, what prevents so much goodness from being good? I am not sure that any amount of looking at pictures, or even looking at pictures with your eye as far as possible upon nature, would give you an exact key to the relation of these classes of pictures; at least, I notice this, that an immense amount of the best study of both pictures and nature together does not seem to have given that key to the people most competent to study the subject. But when I looked at them, the question suggested itself to me, not only in respect to painting, but in a more general way. What I observed was, that those painters who painted the third class of pictures had acquired a curious art—an art of doing right and wrong at once. For there was a palpable wrongness. The first thing which anybody who wanted to paint ought to be taught to do is to draw with exactness and accuracy, and not, when the object is of one shape, to put another shape; so that there lies a distinct duty upon the person who designs to paint. And yet, somehow, the painters manage to paint the best pictures by setting that rule at defiance. It is quite clear, if you generalise the terms, that these people have managed to do at once right and wrong; and we call that being true to nature—we call it Art; and we find in it the highest development of the human faculty. Then in doing at once wrong and right they have succeeded in doing a right that is

righter than the right which they tried to do. You find that right is capable of existing in two quite distinct forms, and that one of them is a true right, and that the other is not a true right. For when you come to look at those pictures which attain such an extreme degree of exactness, you perceive distinctly that though you might be pleased with them so long as you did not see the others, yet that they become at length distinctly unsatisfying, repugnant, tiresome; you get after a time, in spite of their beauty, nay, because of their beauty, to feel a certain anger with them. I notice this about them, that they deserve to make us angry because they profess to be what they are not. They profess to be the representations to us of what nature is, but to our eyes as clearly as possible they do not look like what nature is; they look like pictures; men so drawn do not look like men, they look like dolls—images of men. Clearly something tells us, when we get the chance of comparing a picture of that sort with a picture of the third sort, that what we want from a painter is not something that looks like an image of an object, but a picture that does truly produce upon us the impression of the object. So our eyes become absolutely intolerant of this kind of goodness of the painter.

Well, then, to go on—thinking about this painting, with a glance cast now and then at the moral world, we perceive that the painter has got three ways of painting—that one of them is truly good, and that two of them are bad. This is an important point with regard to painting. Art is different from the business of an architect, who makes designs to be worked by. The right of the architect is the wrong of the artist. The architect has got two ways of drawing—a good way and a bad way—the accurate and the inaccurate way. The painter

counts both of them wrong, and sets up a third way which is his right, and that right is more akin to the architect's wrong than to his right—indeed, so much akin, that, except for some mysterious odd kind of difference (which I have never heard any one define), mere bad drawing might pass for true art. So that what one comes upon is this, as it seems to me—that the very nature and becoming of art consists in making right coincident with a wrong. It is the art of doing right and doing wrong together; that is the thing in which the emotional faculties of men find their truest delight, so far as painting goes—I do not mean to speak of other arts. Now I believe, as to the inexplicable charm of a true painting upon us, which it produces quite independently of its subject or of any ideas which it is designed to express, which we feel almost more purely when there is nothing in the painting at all, and when unromantic, unsublime subjects are sought out, because then we get this peculiar charm of art alone, and feel it by itself there is a magic in it, a rightness and a wrongness that fascinates us—we don't know why, but we know this, that it is true to nature. If that fact gets hold of the mind as a really important thing, as a thing worth thinking about, I do not think it is so difficult to see why the artist's right must have a wrong in it. You know that nature is really infinite in its complexity, and that if a person puts down on a piece of canvas simply just so much of what presses upon his eye as he can reproduce upon a plain contracted surface with extremely gross fingers, as compared with the delicacy of Nature's, he does not represent *Nature;* he chooses out certain parts of her, and gives them all that belongs to them as far as he is able; but an innumerable number of other things he totally leaves out. He says, "These things have certain rights, and I have given them." But in

giving them these rights he has left out an immense number of things which he could not put upon his canvas. If he delineates accurately a few objects, he does this at the expense of others. But further, nature does not consist merely of objects, even supposing he was able to put them all on to his canvas, but it consists of objects bathed in light, [illegible]s to paint this light as existing, this a[illegible]thes them. And then there is anoth[illegible]s more important still: when you come to [illegible]what nature is, Science has a word to say; and [illegible] out, I think from the scientific point of view, t[illegible] objects which our eyes seem to see and our ha[illegible]andle—these separate things, the aggregation an[illegible]osition of which make up nature to our apprehension—these are not the true nature at all; Science teaches us quite differently; it represents nature as a constant flux of forces, a constant process and series of changes, in which it can recognise action but knows nothing of substance. Now, if art could be true to nature by representing a destined number of things side by side, there would be a conflicting representation. I think the human sensations would have little tranquillity in the presence of such a fight. As it is, it so happens there is really no fight, because Art has simply outstripped Science, making before her her own affirmations. For Art, whenever it becomes art at all, denies all *things*, and treats things with the utmost imaginable unconcern, making them to be anything which suits some other truth of nature. The fact is, that Science has struggled up to the position of Art. The affirmation which Art from a long period has been making is, that nature is not "things," because, in order to be true to nature, it is compelled to be false to things—which is only another way of saying that nature is not

things. Art represents nature as a process. The only pictures which your eye can regard with true complacency or judge as being true to nature show that photographic representation of objects is not the secret of art.

The artist repudiates the duty of accurately delineating all the objects before him. But the question really is a moral one. For though morals are one thing and art another, there is nothing which can escape from the dominion of the moral law. There is a right and a wrong —a moral right and a moral wrong—in painting as in everything else. Now the painter affirms this liberty in his pictures; he says, "I concede there is a duty here, but my right is in breaking it." Why is he right in breaking it? I think that also is visible. Granted that the reason a painter must be untrue to things is because nature is a process—a constant flux; yet the painter takes no account of that; he did not wait till Science had found out that nature was forces and not things; that was not the painter's reason; it did not justify him. People meaning a wrong thing may do a right one, but that does not justify them. So you see it is not because nature is a process and not things that a painter would be justified in painting what he believed to be wrong to nature. Clearly he is not at liberty to sacrifice the truth of any object because it suits his purpose; that would be absolutely to set all standard of art at defiance: it would make art lawlessness. Yet still he does quite recklessly set aside the claims of the things that he deals with. He does not do this arbitrarily and merely for his own pleasure; we can see what he sets them aside for, it is what we have said. To present those objects with accuracy, he would have to set aside and refuse the claims of other objects. He says, "The right of *that* would be such and such lines, but here is this other object which has claims too; I must use this first object to fulfil the claims of

the other." I must sacrifice (not that he says so, it is what he does) this object if I do justice to that: that is, he paints the sacrifice of one thing for another. You see why he must be true to nature if he represents the act of one thing becoming subservient to another. That is what Science says, each thing merges itself into another. But more than [illegible] In painting nature so, the artist p[illegible]wn life.

But we ma[illegible] one way. While the painter is end[illegible]ately represent certain things which com[illegible]is serving those things. When he is sacri[illegible]gs to fulfil the claims of other things, he [illegible] them, but using them. It does not seem too n[illegible]say that the painter in painting truly makes the objects which he seems to be delineating part of the instrument with which he paints; it is the means of his action, not the end of it. It is a thing which he uses instead of serves. But though I say this, I feel, and you must feel, that it is not *the* truth. When we get into the domain of art, it is not true; though it may have a superficial truth, it is absolutely untrue to say man uses nature at all. The true statement is that nature uses him, that is what makes him what he is: it is nature operating through the artist that divides art from what is not art. Therefore, when we say that the painter sacrifices one object in order to fulfil the claims of another, we are giving exactly an instance of that kind of truth to which the painter has to be untrue. The true truth, which is got at underneath all that, is *this:*—while the painter truly uses that one object to fulfil the claims of another, although he does truly do so, he is painting this object inaccurately, and by this very inaccuracy he makes it serve the demands of some other object which thus becomes represented.

I have said that the painter uses one object to fulfil the claims of another, making it, as it were, its instrument; but in truth the object makes him *its* instrument, uses him as the means of its sacrifice for another thing. That is what we mean, or ought to mean, when we say the painter is true to nature. The fact of nature is perpetual sacrifice of all things—that is, of all that being which we perceive under the form of things; perpetual sacrifice of all being for every other being. The painter paints truly to nature by being the instrument of the sacrifice of one thing in nature for its fellows. He is true to nature, not in reproducing any appearance, but in representing that absolute fact of nature — the act of sacrifice.

If we see this in art, we see clearly that there is good reason for the world looking with such admiration, with such transported eyes, upon the works of the painter. For observe, he is not painting pictures alone; he is painting life, he is painting humanity, showing us not only the art of using the brush, but the art of living. He has been painting for us the very fact and law of sacrifice. We may well wish to know the limits and the laws of this wrongness which the painter puts into his rightness. I have looked at pictures a good deal, in order to make them tell me what were the rules and what the limits by which and up to which the painter might deviate from accuracy in his drawing, and I came to this conclusion—that there were no rules and no limits; that he might deviate in any way and to any extent; that there need be no shadow of resemblance between the patch of colour and the object it is supposed to stand for. The painter seems to act with absolute license, yet we know, of course, that he obeys an absolute law. What is the law? It evidently has no

relation to the thing. The only law laid upon a painter is—that his sacrifice of the object shall be one that nature gives him a right to make; that he shall make it for her sake and not for his own; the sacrifice shall not be wanton, but for the sake of something else. The departure from accuracy must be a sacrifice of one claim to another. That is the only law and limit. The painter need not paint accurately at all, (nay, he paints badly if he does); but in deviating he must paint two things at once. If he does, he is painting rightly, however wrongly—that is to say, he is right in his action so far as it serves: he is wrong when it does not serve. His duty of truth may be sacrificed to any extent for service. Or, to take it in another way, we perceive a duty lies upon him. We cannot see the moral relations of the subject unless we bear in mind that to the painter accuracy is a duty absolutely laid upon him, and yet not laid upon him. What takes its place then? If he has not to fulfil that duty, what is it that he has to do? In sacrificing one object to the claims of another, he fulfils two duties at once. I do not say one duty is greater or higher than another, but it is to be noticed that there are duties which are laid upon us by ignorance because we do not know. The duty that doubt imposes is always different from that given by complete knowledge. What I think is that any duty may be sacrificed to any other duty, but it must be duty to which it is sacrificed, for in sacrificing one duty to another he *is* fulfilling two duties together. The duty sacrificed is fulfilled in the heart. For if it were not so it would not be for another duty, but for self, it would be sacrificed. Thus, then, what the painter shows us is the art of fulfilling two duties at once, for which observe we must in a certain sense do wrong.

All true art has an outside appearance of wrongness. Look back at the earliest art. The painter (speaking of the race) began with endeavouring to be exact to the object that he drew. What was the power that forced him from that, and compelled him to be inexact? Remember what sort of man the artist is. No man ever gained the homage of the world to whom the rightness of his art did not take the place of all rightness else; who could not have refused to falsify his picture for the sake of heaven. He must have found all righteousness, all holiness, all virtue, all sacredness, in the truth of his picture. If he was not that, he was not of importance; he might be a very good man, but he was not a person who could have advanced the art of painting. His whole soul, his whole moral nature, centred round painting, and painting stood to him in the place of everything that we call virtue to us; and the success in making his picture what it should be was what heaven is to us. So we see what a terrible thing this man did, from his point of view. *We* might say, "He would like his picture better if it were so and so." But that man would never speak so. To him it would have been the simple obliteration of his whole moral nature.

He did not care whether he liked his picture or not. He would no more have made it false than you would steal a man's property because you do not like to be poor. I suppose that not having money in your purse would not have much effect towards making you put your hand in another man's pocket. But the painter would steal not from another man, but from nature. What he saw was that his picture was not true, and of course he tried to make it more true—that is, more and more exact—and yet it became more and more unlike nature. On this point I have a theory—whatever else

may be in nature, certainly our hands are in nature, and, of all hands, a painter's hands are pre-eminently so. Now my guess is this, a painter comes to paint rightly in painting wrongly, but he does not give up trying to paint rightly; in mere weariness, I fancy, he shuts his eyes a little while and meaning nothing, lets his strokes express the Now this hand has got in it, ha exactness to the object which he see rould be torture to put away; so whe o restrain it any more, but gives it liberty, as express two natures at once, I believe he fir way the true right of art. He gets so tired indulges in a little bit of freedom, and finds that for the first time truly fulfilled law. I do not believe that he plans it all, but that he yields to the "natural passion" of his hand; he finds out that his hand cannot draw anything that is not true to nature—that it can have no pleasure in it. The hand is a wonderful exhibition of the true form of nature; man's hand goes very deep indeed into nature's heart. What is true to the nature of the hand must be true to the make of nature down to the very bottom. Anything that is true to the make of an instructed hand must be true to her. You cannot go into a true artist's studio and take up a single scrap of paper that he has touched without seeing how true to nature it is; his hand will not do anything else. But observe, he has broken the law, though he did not mean any breaking of the law. I believe that this is very important, that the hand is truly an art organ, and that its structure is a power by which nature leads the painter to his truth. The natural desires, the emotions, we might almost say, of the hand express themselves against the restraint which the mere outside appearances impose. It is the

affirmation of the natural impulse of one part of the body. I believe there is more than an outside resemblance between the mere bad drawing and the true drawing. You will observe there is a reason why there should be; for mere bad drawing expresses the natural motion of the hand, though it lacks those elements which the practice of the painter gives. I believe that if you take that mere bad drawing, such as a child scribbles, you will find it divisible into two parts, and that one part only is the mere wanton deviation from truth. For observe, fulfilling two duties at once must have the appearance of not fulfilling any duty; there is the curious point that fulfilling two duties at once must have the look of refusing duty; it is a refusing one duty. There is a part of a child's drawing which really does serve and express the wider claims of nature. The true artist, as it were, divides the bad drawing into two parts; he incorporates into his drawing that which will serve; that part which expresses the natural motion of the hand, and puts aside that lack of skill which causes the mere badness. That natural motion of the hand is a permanent element of good drawing, and in so far as bad drawing contains it, it contains an element of good drawing; for we must remember that the true artist has not only to deviate from exactness when he draws many things together, but in drawing even the minutest thing. There is another point also; bad drawing is a pleasant thing to a person who cannot draw well; he may enjoy it very much; and, indeed, it is much easier to draw badly than well; but if we look at that pleasure, we find that it demands an analysis. It is evident there is pleasure in any kind of true drawing; there is pleasure in accurately representing an object; there is pleasure in that kind of bad drawing which makes the drawing more true because it serves.

But how can there be pleasure in merely drawing badly? In as far as any one draws simply falsely, he simply fails. Failure is essentially pain; pleasant as it may be, there must be incorporated a pain with the pleasure. There is that which serves the truth, which is pleasure. Then there is failure, which must be the contrary. Bad ...u take it as a whole, it may be very ...porated in it something which is pain... ...y to draw well may make it tolerable. ...rawing is a mixed thing. The false part of it is ...nt of the pleasure, but a detraction from it. ...y the inability on which it depends, it simply ... impossible thing. It merely expresses failure, ...e painful thing; because when failure is no longer inevitable it is always avoided. The question may be asked, Why do not people always do their best if it is more pleasant? But what is here meant by their "best" is the *false* right. In trying to make any one draw better you are trying to make them draw more exactly. Then, again, all science may be summed up in this—in the discovering that the truth of things is very different not only from the appearance but from what is practically true. Science is not practically true; what is true is this: if you take what it affirms as the key to your experience, you can give it a rational interpretation. Yet it is still held absurd to affirm anything of men that is not practically true. The truth of human nature unquestionably is not practically true. That is the truth in respect to man which, if you take it as a key, will account for your experience of him. The great illustration in respect to science is this—that motion never ceases—which is practically entirely false. The planets gravitate to the sun. Do they practically do that? Yet

how strange it is that we take for granted that the only truth about man must be that which is practically true? It simply means that there is no science respecting man.

So I adhere to my proposition, failure is painful; and it is proved that it is nothing but failure that makes really bad drawing; for if you give ability to draw well, failure is impossible,—it is so painful. Now surely three things are parallel:—Mere bad drawing answers a life of pleasure; good drawing answers to self-righteousness; and good art answers to true goodness. Now, if that analogy holds good, although the proposition does not rest on that analogy, a curious thing follows. True art divides bad drawing into two elements—one part of it which serves (and serves, very probably, because it expresses the true and natural motion of the hand), and another part of it which is no more failure. Suppose true goodness should stand in the same relation to the life of pleasure. You will observe that the thought of good drawing that makes it to consist in exactness draws the line of right wrongly; it puts into the line of badness all that deviation from exactitude which belongs to true art; it divides goodness against itself; it prohibits goodness from being reckoned as goodness. Altogether it is a false line; it is not the true line of right. It makes a false division. If you want to show the true line of right in art, you must take in a certain portion of that which is included in bad drawing, and transfer it into good drawing; then you will observe the very accuracy divides itself in some way; a part of it belongs to good drawing, all true bad drawing, though it is one, yet looks like two. All that false drawing and all that exact drawing alike which is not for service, these make up bad drawing; all false drawing which serves is included in good drawing. The line of goodness is drawn falsely;

whatever serves in what is called bad belongs rightly to true goodness. It is the same in respect to right and wrong, restraint and pleasure, as it is in respect to drawing; all that serves is good. We have to draw afresh the line as art teaches us. Every duty that forbids service is a duty that we ought to sacrifice; the duty that forbids service is a false a[illegible]nly be good as they repudiate it. [illegible]e to take the pleasant things that [illegible]asure of them, but for the service o[illegible]ue goodness.

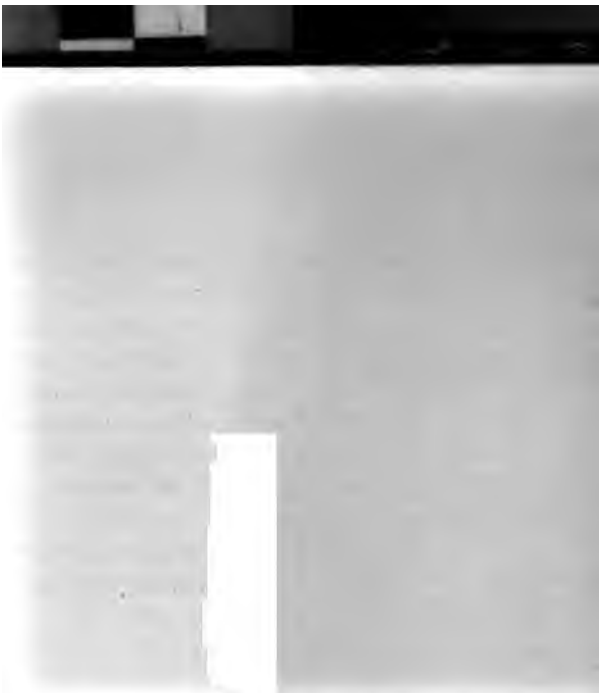
When nat[illegible]g would be of service, that is, I take it, [illegible]er [illegible] do it. Now there is a special difficulty which [illegible]uts in her own way in our comprehending that [illegible]ling us to do pleasant things in the fact that pleasant things, because of their pleasantness, have been done by vicious people. If we are sincerely anxious to do good, the unpleasantness of a duty will not be a hindrance; it almost becomes a reason for our doing it. Nature can tell us with perfect ease, Do the things that are unpleasurable. If she has to tell us to do a thing that is pleasant, that is a difficulty in her way, for that is a thing which some people do wrongly. We say, "How can I do that? She has made it more difficult for those who wish to be good to do pleasant things."

Now human life must bear the mark of that; it will inevitably be visible in human life that men have been hindered from doing things which are pleasant to them through the fact of their having been done badly.

You will find there are a number of useful things which we should never dream of refusing to do except because they are pleasant. But people doing a thing for themselves, is not a reason why nature should not want it to be done. Surely there is no design more beautiful

than this. It keeps man's life from failing of its full development. Nature will not let a tree bear fruit too soon. An animal that is worked too early never reaches its full strength. So she contrives that the "nutrition," the restraint in human moral life, shall reach its full development. By this means partly she ensures it.

Human action is divisible into two portions,—the portion that is pleasure, and the portion that is not pleasure. When men outstep the line of service they take pain as well as pleasure. It is nothing but failure. Give them the ability to avoid the failure, and they prove to you that it is painful.



PAPERS

ON

SCIENTIFIC SUBJECTS.

XXIII.

ON THE PROXIMATE CAUSE OF FUNCTIONAL ACTION.

1856.

THE actions which take place in the animal body naturally divide themselves into two classes—the nutritive and the functional; or those which are concerned respectively in the formation of the organs and their use. In some instances it may be difficult to draw the exact line at which nutrition ends and function begins, but for the most part the distinction is clearly defined, and theoretically the separation of the two forms of action is always easy. There are three forms of function—nervous action, muscular contraction, and secretion. Taken in a large sense, these divisions appear to include all the active functions known to exist in the human body.

In the following remarks, no explanation will be attempted of the phenomena of nutrition: accepted for the present as ultimate facts, they form rather the basis upon which it will be sought to found a consistent theory of the cause of functional activity.

Little doubt can be entertained that the force which is operative in the vital processes is but a peculiar manifestation of the same force (or forces, if there be more than one), with which we are familiar under other names, as regulating the phenomena of inorganic nature. But although thus, in its origin, one with the other physical

forces, the peculiarity of the conditions under which it exists in the living bodies imparts to it specific properties, to designate which the term *vital* is employed. One of the most characteristic of these peculiar modes of action of the vital force is the opposition which it presents to the operation of those forms of force which are termed *chemical*—an opposition not of essential nature, but of special direction. The vital force (or, as from this point of view it might be called, the vital affinity, for the sake of bringing out more clearly at once the relation and the contrast) controls and holds in abeyance the chemical tendencies of the matter in which it subsists.[1]

From the state of chemical tension thus arising, it results that there exists in all living matter a constant tendency to change. No sooner are the conditions requisite for the manifestation of vital properties withdrawn, than chemical affinity resumes its sway and decay commences. Even during life the same process is continually going on. The tissues waste, and are renewed, and waste again.

A certain connection between this waste or disintegration of the tissues and the functional activity of the body in which it takes place, is universally admitted. Yet the relation which subsists between them is by no means satisfactorily established. For the most part, the activity is held to precede and cause the waste.

"Discharge of function, *consequent degeneration*, absorption, and replacement by new structures."

"In the history of a cell there are three stages—that of its

[1] There can be no difficulty in conceiving forces essentially the same acting thus circumstantially in opposition. Innumerable instances will occur to the mind in which heat, for example, opposes chemical affinity, or gravitation itself raises or suspends a weight.

growth, of its decay, and the intermediate one of its functional activity, which is dependent upon the first, *and which causes the third.*" [1]

"We may look upon the death of such cells (the muscular tissue), whose term of life might otherwise have been considerably prolonged, *as the result* of the expenditure of their peculiar modification of force under the guise of mechanical power." [2]

In this representation it appears to me that the relation of cause and effect is inverted—that the existence of a controlled and subjugated tendency to chemical change in living bodies is the origin of all the capacity for functional action which they display, and that the disintegration of their tissues is not a "result" or "condition" of their activity, but rather the moving spring and source of that activity itself.

The life of the body being one, its functional power must be one also. Widely as they may differ in their immediate form and object, the functions, when regarded in relation to their origin, may not be isolated from each other. They are common products of a single power, which requires to be investigated at once in all its modes of action. Hence probably the want of success which has attended the various attempts that have been made to trace the physical causes of separate functions. But, on the other hand, much of the obscurity which attaches to the ideas of life and the vital force appears to have arisen from the attempt to include under one denomination, and to refer to one mode and development of force, phenomena of diverse, and indeed opposite characters.

Broadly as the line of demarcation is drawn by nature

[1] Dr. Bucknill, British and Foreign Medico-Chirurgical Review, No. 29, p. 226.

[2] Dr. Carpenter, Human Physiology, p. 109.

between those processes by which the living organism is built up and maintained, and those which involve the death and disintegration of the tissues in which they occur, the prevailing tendency of physiological speculation has been to include both series of actions under one name, and to refer them to the immediate operation of a common power. They have termed indiscriminately *vital actions*, and adduced v distinction as instances of the direct operation of t l force.

Thus Liebig says: "Th or available vital force in certain living parts i ause of the mechanical phenomena in the animal m."[1]

And Dr. Carpenter thus ses himself: "The contraction of any muscle upon pplication of a stimulus must be attributed to an exercise of *vital force* engendered by previous acts of nutrition."[2]

And again, speaking of muscular and nervous action, he says: "We are entitled to affirm that each is a peculiar *modus operandi* of the same force as that which is concerned in cell-formation."[3]

According to this view, the vital force is made the direct agent in actions essentially different. Hence arises the impossibility of defining it; for while the words are so used it is surely in vain to seek to attach to them any signification more definite than that of a general expression for all the changes which take place in a living body. Any term similarly used would become equally obscure and unsettled. By thus including in one category actions so opposed as function and nutrition, the phenomena of life are placed in an attitude of irreconcilable variance with those which pertain to all other branches

[1] Organic Chemistry of Physiology and Pathology, p. 221.
[2] Human Physiology, third edition, p. 476.
[3] Philosophical Transactions, Part 2, p. 737. 1851.

of physical science. The fatal error has been to overlook the fact that two forces (or modes of force) are at work in the living body. It has not been perceived that the *chemical* affinities of the animal organs constitute a source of power co-equal with, and precisely measured by, the power of the vital force. The work of two agents has been assigned to one. If now the omission be supplied, and the vital and chemical forces be recognised as the two forces of organised matter—the former as the resistance, the latter as the resisted force, and therefore the force available for action—a large part of the obscurity which envelopes the theory of vital action is at once removed. An uniformity of principle is seen to prevail between the laws of the organic and inorganic worlds, and the facts hitherto so intractable arrange themselves without difficulty in accordance with some of our most familiar conceptions.

Bearing in mind that no explanation is offered of the nutritive processes in the living body, it will be seen that upon the theory propounded there is a perfect analogy between the animal body and a self-acting machine.

In both there exists a mechanism adapted to the performance of certain defined actions, and a reservoir of power or force by which that mechanism is kept in operation. In both, the source of this power is essentially the same. In living bodies one tendency of matter, its chemical affinity, is held in check; in any machine that is to manifest a capacity for action, art must bring into a like condition of restraint some tendency of matter, either the same or similar.

In the simple instance of a clock, the gravitation of the weights, controlled by an adapted mechanism, is the power which effectuates its functions—the revolution of the hands, the striking of the hour. In the watch, the restrained elasticity of the spring holds the same rela-

tion. The steam-engine owes its power to the repressed expansiveness of the vapour. There is no instance, indeed, of an artificial accumulation of force or capacity for action that does not depend upon this principle. Matter restrained from the fulfilment of any of its natural tendencies affords power: the removal of the restraining force, permitti tendencies so controlled, produces actio ay be made to subserve any purpose by suit n on of the resistance, and the employment of an ad echanism.

In this respect the org d inorganic worlds obey a common law. Organi ives capacity for action only by virtue of the resi presents to the chemical forces; these chemical for ng under definite limits, and in connection with various structures, being the true sources of all functional activity. A living body is a divinely-made machine, constructed, indeed, with a marvellous delicacy, perfection, and complexity, and depending upon a power, the vital modification of force, which it is wholly beyond our skill to imitate or comprehend, but still involving in its *working* no other principles than those which we every day apply, and see to regulate the entire course of nature.

For the inorganic world furnishes abundant instances of the same balancing of forces resulting in a similar activity or capacity for action. The term *irritability*, in so far as it denotes a capacity for responding to stimuli, confined hitherto to organised structures, might with perfect accuracy receive a more extended application. It exists in whatever form of matter there is found the same powerful tendency to change of state with which it is associated in living bodies. Thus, in the chloride or iodide of nitrogen the slightest touch induces an explosion. In the case of gunpowder, the tendency to change in which

is less energetic, the chemical affinities of the materials are brought into action by the momentary application of intense heat. In the same way a solution of certain salts, when the cohesive force is barely counterbalanced by the solvent power of the water, will assume the crystalline form upon the gentlest touch, or the mere passage of a vibration. The slightest scratch causes unannealed glass to break.

In these instances—and very many more might be adduced—it is surely correct to say that action ensues on the application of a stimulus; and in them all it is obvious that the action is immediately due to pre-existing and restrained tendencies to change of state. The stimulus is only in a secondary sense the cause of the phenomenon, and evidently determines it by removing the condition which forbade the previous operation of those tendencies. In all such cases the *modus operandi* is the same as that of the mechanisms previously referred to, and they are precisely analogous to the simpler contrivances in which a suspended weight is made to fall upon the disturbance of its equilibrium by slight causes.

If the doctrine of the correlation of the physical forces be applied to material actions or changes of this class, it becomes at once apparent that the correlated force is neither the resistance nor the stimulus, but the controlled or latent tendency to change.

Thus, *e.g.*, the application of a certain amount of heat to a magnet suspends its attractive power. If, therefore, to a magnet sustaining a mass of iron sufficient heat be applied, there results an action—the fall, namely, of the iron to the earth, the cause of this action being the gravitation which the magnetic force had previously been exerted in controlling. It might be said that the gravitation is converted into motion; it would never be pro-

posed to a ribute the motion to a conversion either of the magnetic force or of the heat into mechanical force. But in respect to the animal functions, this very error has been committed; for in the illustration above cited the magnetic attraction represents the vital affinity or force, the gravitation the repressed chemical affinities of the living tissues, the he imulus, and the fall of the weight the function.

Many arguments ma ced to show, that while the Correlation Theory consistent and beautiful expression of the relatio xists between the forces of the external world and velopments of the vital force in the growth and n of the body, it is entirely misapplied when it is pro s an explanation of the connection of the vital force with functional activity.

In the first place, this view entirely ignores the balanced state of the forces in the animal economy, and the accumulation of power arising from the repressed chemical affinity, which it regards merely as operating, after the vital force has discharged the function, in reducing to simpler compounds the devitalised tissue. Surely this is utterly opposed to all we know of the economy of force which prevails throughout nature, and pre-eminently in the living body, in which no power, how subordinate soever, or apparently trivial, is ever wasted.

It is unquestionable, that in this state of equilibrium of the chemical and vital forces there exists an arrangement by which great results might be accomplished. Everything is prepared for the exhibition of a large amount of power by the mere permission of the play of chemical affinity. Would it not be a gratuitous squandering of resources that such a capability for action should be turned to no account?

2ndly. To suppose a conversion of the vital force into

functional action, is to set aside an actual and sufficient cause in favour of one that is entirely hypothetical. The state of chemical tension in the animal body, and the co-existence of chemical change with functional activity, are admitted facts: that this chemical action in the tissues gives rise to the external manifestations of function, is an inference as simple as that the chemical change among the particles of gunpowder is the cause of its explosion. How, then, are we justified in assuming the existence of another process, hard to conceive, and impossible to demonstrate?

3rdly. The theory in question, while it rejects a cause so natural and obvious, in reality involves the idea of an effect without any adequate cause at all. No intelligible relation of cause and effect can be shown between the stimuli which excite the functions and the conversion of force which they are supposed to cause, or for which they "supply the condition." No proportion is maintained between the amount of the stimulus and the amount of force converted. In what way, for instance, can gentle pressure on the thumbs of the frog, during the season of coitus, produce a conversion of the vital force of nearly all the muscles of the body into an energetic contractile action?

4thly. Waiving all theoretical objections to the view of the correlation of vital force and functional activity, it may be remarked that the facts do not agree with the principles of that doctrine. The "material substratum" is wanting. In the conversion of the vital force of a muscle into mechanical force, for example, there is no change of the matter in which the force subsists. The conversion supposed is precisely such as would occur if a heated body were suddenly and without adequate cause to lose its heat, and manifest electricity

instead, or shoot into spontaneous motion. The view propounded by Liebig—viz., that the vital force which is converted into mechanical force in muscular contraction is not that of the muscle itself, but may be derived from any other part of the organism, and conveyed to it by the nerves—would be more accordant with the terms of the theory, but we know experimentally that it is not correct.

5thly. The vacillating language used in reference to this part of the subject, by those who have most successfully applied the doctrine of correlation to vital phenomena, betrays the unsoundness of their position.

"Muscular contraction," says Dr. Carpenter, "may be regarded as proceeding from the expenditure or metamorphosis of the cell force, which ceases to exist as a vital power, in giving rise to mechanical agency." But speaking of the external stimuli of muscles, he adds: "These agencies are concerned in occasioning that metamorphosis of living organised tissue into chemical compounds, whereon the development of the muscular force seems to be immediately dependent."[1]

Are not two different origins here assigned to muscular contraction? Again, Dr. Carpenter observes (p. 747), "We are, then, to regard the *nervous*, electrical, and other stimuli under whose influence the muscular force is called forth, less as the immediate sources of that force than as furnishing the conditions under which the vital force, acting through the muscle, is converted into the mechanical force developed in its contraction." But at p. 745, we read: "The *nervous* force appears convertible into motion through the medium of the muscular apparatus."

With regard to the nervous force, Dr. Carpenter writes as follows: "We find only one kind of tissue

[1] Philosophical Transactions, Part ii., p. 746. 1850.

serving for the generation and transmission of nervous power, this alone affording the material substratum through which the *vital force* can manifest itself as nervous agency." And again: "Nerve force *which has its origin in cell-formation* may excite or modify the process of cell-formation in other parts" (p. 743). But, on the following page, he argues, that "all the facts that have been adduced in support of the identity (of the nervous force and electricity) will be found readily explicable on the idea of their correlation or mutual convertibility."

Can the nerve force be both a manifestation of vital force and a result of the conversion of electricity? Can it have its origin at once in cell formation *and* in a galvanic current? And yet, further, are there not the same reasons for holding that the electrical stimulus only furnishes the conditions under which the vital force is converted into the nervous force, as exist in respect to muscular contraction?

Even Liebig's perspicuity fails him upon this subject In his observations "On the Phenomena of Motion in Living Bodies," he writes thus: "All experience proves that there is in the organism only one *source* of mechanical power; and this source is the conversion of living parts into lifeless amorphous compounds." [1]

But at p. 220, "As an immediate *effect* of the manifestation of mechanical force, we see that a part of the muscular structure loses its vital properties, its character of life."

Is not the same change thus made both cause and effect?

The last writer on this topic, Dr. Reynolds, in an able article "On the Objects and Scientific Position of

[1] Op. cit., p. 242.

Physiolo ,"[1] is not more definite in his language. Compare the following passages:—"The partial disintegration of the tissues (of the muscular and nervous systems) is one condition or *source* of their action" (p. 112). "We have therefore to regard these animal properties (sensibility and muscular contraction) as functions of the *vital* erent in the cell, and as constituting two of its dowments" (p. 118).

In the passages abo —and many more of the same character might ced—two contradictory ideas appear to have ruggling in the writer's mind, and alternately e colour to his language. One is, that motion, or ction, as the case may be, is a direct expression o. tal force; and the other, that it is the result of the chemical disintegration of the muscular or nervous tissues. Owing to this cause, the words used virtually assert that the retrograde metamorphosis of the tissues, or their conversion into lifeless compounds, is a result or manifestation of the vital force, which is in its very terms a contradiction.

To these considerations it may be added, that to affirm the function to be the result of the accompanying disintegration, is to adopt the negative side of the argument. It enables us to reject altogether *sensibility* and *contractility*, as separate properties of the nervous and muscular tissues, apart from their known tendency to chemical change. And no principle in science is better grounded than that nothing may be assumed to exist without a proved necessity.

The substance of what has been advanced may be briefly stated thus. Dynamically considered, the changes which take place in the inorganic world are divisible into two classes—those which directly result from the

[1] British and Foreign Medico-Chirurgical Review, No. 31.

application of some new force to the matter in which they occur, and those which ensue from pre-existing tendencies to change when some force previously operative is neutralised or overcome. The former class of material changes are characterised by an absolute proportion between the force applied and the resulting action; the latter are distinguished by their spontaneity, or the disproportion (often extreme) between the apparent cause and the result.

The endowments of living beings embrace both these forms of action. The first is seen in the processes of nutrition, development, and growth, the forces engaged in which are truly correlated, as Dr. Carpenter has most ably shown, to other forms of force. The changes in which function consists exemplify the second, being effected by the chemical affinities of the elements of the tissues, when the vital resistance is in definite manner and degree diminished.

Treating the question thus on abstract grounds, it can hardly be denied that the view of the vital functions above propounded possesses great simplicity, and by virtue of its wide analogies, a certain amount of *à priori* probability. It aids in reducing to the smallest number "the assumptions which, being granted, the order of nature as it exists would be the result." But it cannot on such grounds claim acceptance, unless it be capable of an unstrained application to all the phenomena which come within its scope. It would almost appear, indeed, to be so natural an interpretation of the facts of animal existence, that had it been the true one, it could hardly have been overlooked or rejected, and that the class of functional actions must have presented characters which, indicating the direct agency of the vital force, forbade them to be grouped under so simple an expression. I

shall proceed, therefore, to an examination of some of the leading facts connected with the animal functions, and inquire:—

I. How far the actions of the nervous system may be interpreted upon the principle suggested. From such an inquiry it is of course necessary to exclude altogether the phenomena of thought and volition, viewed in their psychological relations. Of the mysterious process by which a material change in the brain awakens a perception or kindles a thought, we are entirely ignorant; nor can we form any conception of the mode in which the spiritual will communicates its behests to its obedient instrument. Whatever theory be adopted of nervous action, these relations must remain equally inscrutable. Confining our attention, therefore, to those operations of the nervous system which are strictly physical in their character, it may be remarked that all the stimuli which excite them are adapted to bring into activity the repressed chemical affinities of the organic elements. Thus the nervous force is called into action by mechanical irritation, or motion in whatsoever form applied, by changes of temperature, by chemical reagents, electricity, light, or sound, and by the sapid and odorous properties of matter. It is hardly possible to perceive in these various agents any property in common to which their influence upon the nervous system can with reason be referred, except the power they all (so far as they are known to us) possess of disturbing an unstable chemical equilibrium. They cannot all supply a force which is converted into the nervous force. They have no visible adaptation to cause such a conversion of the vital force. No analogy warrants the assumption that they can immediately produce a state of active polarity. But acting upon a tissue in which the affinities of the component

elements are so delicately balanced, and the inherent tendency to chemical change so strong, it can hardly be otherwise than that they should overthrow that balance, and bring into play the latent and coerced attractions.

"In compounds in which the free manifestation of chemical force has been impeded by other forces," says Liebig, speaking of inorganic substances,[1] "a blow, or mechanical friction, or the contact of a substance the particles of which are in a state of transformation, or any external cause whose activity is added to the stronger attraction of the elementary particles in another direction, may suffice to give the preponderance to this stronger attraction, and to alter the form and structure of the compound."

That such an actual change of the composition of the nervous tissue does ensue from the action of the stimulus, is proved by the fact that the same stimulus will not reproduce the effect until after the lapse of a certain interval. This should not be the case if the stimulus merely induced a polar state, or itself assumed the form of the nervous force. The necessity of time for the renewal of the irritability is evidence of an altered composition.

Instances have been adduced from the inorganic world of the production of action in substances prone to change by slight mechanical irritation, which may be referred to as the analogues of the sense of touch. The senses of sight and hearing are susceptible of illustration by similar analogies.

To prepare a plate or paper for photographic purposes, it is only requisite to apply to it a suitable chemical compound, the elements of which tend to assume other relations, and of affinities so weak as to be overcome and

[1] Op. cit., p. 207.

neutralised by light. Thus prepared, the paper is called sensitive, and it would appear to furnish a very exact illustration of the process by which vision is affected.

The retina consists of matter prone to change. Its elements break up and enter into new relations immediately the vital force or affinity which holds them in their existing combinati ases, or becomes impaired. What hypothesis can ore simple than that the luminous rays of the m should have the power, to a certain extent, of lising this delicate affinity, and thus causing, or, to more correctly, permitting, a definite chemical cha take place in the retina; just as the actinic ray. oming the affinities of the photographic salts, cause rmit a new arrangement of their elements?

The sense of hearing also admits of explanation by the application of the same principle. In the texture of the auditory nerve it appears that the chemical and vital forces are so balanced that the sonorous vibrations overthrow the equilibrium, and bring into activity, as in the case of light, the chemical affinity. An illustration of the nature of the action is furnished (if we may compare great things with small) by the fact mentioned by Rogers, that masses of ice and snow of considerable magnitude may be precipitated from the Alpine ridges by the sound of the human voice. The gravitation of the masses, and the resisting forces which maintained them in their places, being in such exact equilibrium, that even so slight a motion of the atmosphere suffices to give the preponderance to the former. This illustration, remote though it may seem, is valuable, as bringing clearly before the mind the essential character of the process which constitutes the animal function. For the stimulus in this case, the aerial vibration, palpably induces the resulting action,

not by any direct agency, nor by a conversion of one form of force into another, but solely by disturbing the equilibrium of the counteracting forces, and neutralising the resistance which opposed the force of gravity.

Such a change of composition in the nervous substance must tend directly, in conformity with all our knowledge of physical laws, to produce a polar state or force, corresponding in every respect with that which we term the "nervous force." The close analogy which exists between the nervous force and electricity, strongly confirms this view of its origin and nature. For we recognise chemical change, and especially the decomposition of compound bodies, by means of stronger affinities acting on their elements, as an invariable source of the electric force; and Mr. Grove has demonstrated its existence as a result of the changes which take place in the photographic process. In the living body, it would appear that the decompositions (if they may be so called) in which the exercise of function consists, give rise to a force—not electric, indeed—but of a peculiar though analogous character, inasmuch as the changes in which it has its origin, though analogous to those which take place in inorganic matter, are yet of a distinct and peculiar order. Thus regarded, the nervous force, in its relation to functional activity, may be defined to be a polar condition, or other molecular change in a nerve, akin to that which exists in a body conveying a current of electricity, and arising from a chemical change either in itself or in any of the tissues with which it is in relation. This change being the result of the chemical affinities of the elements of the tissues, which come into play when the vital resistance is diminished by any force which, so disturbing the equilibrium, is called a stimulus. I have said the nervous force may be thus defined in its relation to functional activity, because there appears to

be much evidence that the changes which constitute the development and nutrition of the tissues also give rise to a force, which, traversing the nerves, contributes materially to the energy of the vital processes, and more especially, perhaps, to the sympathetic development of various portions of the body, and the general condition of vigour which is denominated tone. This question, however, does not fall within the scope of the present paper, which relates only to those actions in the living body that are attended with a retrograde change of structure.

The nervous force, therefore, having its origin in chemical or anti-vital changes, must possess an especial adaptation for exciting changes of a similar character. Hence it is pre-eminently the excitor of function, causing in any organ to which it may be conveyed the same subordination of the vital to the chemical affinity from which it sprang. To take another illustration from the eye. Light impinging on the retina determines therein a chemical change, which develops in the optic nerve the nervous force. This force causes in the brain an action of the same order as that in the retina. Hence again originates a nervous force, which, conveyed to the iris, causes yet a third time a chemical change, which is the source of its contraction.

That the nervous force, as excited by stimuli, is opposed to the vital affinity, and tends to the induction of changes resulting in the disintegration of the tissues, is rendered probable, not only by its relation to the functional activity of the organs, which is always connected with such disintegration, but also by various facts which show ulcerative or other destructive action to be the result of abnormal stimulation of a nerve, or even of the excessive application of the normal stimuli. An interesting case of this nature is mentioned by Mr. Paget, in which obstinate

ulceration of the palm of the hand was caused by pressure on the median nerve, and which healed immediately the pressure was removed. Another case is mentioned by Mr. Simon, of ulceration accompanying neuralgia of the knee. Nor can such destructive effects be attributed rather to the withdrawal than to the derangement of the nervous force; for although ulceration may occur as the consequence of the division of a nerve, there is ample evidence that it is not due to the mere loss of nervous stimulus, but either to the "irritation" consequent on the division, or to the absence of necessary protection to the organ implicated; and that the abnormal stimulus is often the cause of the ulcerative process in these cases, appears highly probable from a case related by Mr. Simon, of disease entirely destroying the fifth nerve, in which the cornea of the affected eye had ulcerated and healed again.

The view of the nervous force which refers its origin to retrograde metamorphosis receives confirmation from various facts which, upon any other hypothesis, are difficult of explanation. Such are—

1. The increased proneness to functional activity which (with certain limitations) always coexists with diminished vital power, and is implied by the expression that *irritability is proportionate to debility.*

2. The phenomena of certain diseases: as tetanus arising from the disorganising changes caused by a wound, in a debilitated constitution; or those cases of epilepsy in which the cause of the convulsion appears to be merely the mechanical irritation of spiculæ of bone pressing upon the nervous tissue, and the more permanent convulsive action connected with that retrograde change in the brain which is denominated red softening. And lastly, the fact that the mere destruction of the

central ganglia, as by crushing or other mechanical violence, induces a vehement exhibition of nervous energy.

II. An examination of the conditions which determine muscular contraction will show them to be in perfect conformity with the principles laid down. The proposition affirmed being that motor power of a muscle is simply an expression of state of chemical tension in which it exists, and that contraction is the immediate result of a change of condition ensuing whenever the vital state which maintains such tension is, within certain limits, thrown into disturbance.

When placed beneath the microscope, the ultimate muscular fibre is seen to contract first at any spot where it has been broken or otherwise subjected to injury. The slightest mechanical irritation, even the presence of the least particle of matter, determines a local contraction, as also do chemical reagents and water. The contact of the atmosphere, which we know, from the history of subcutaneous wounds, to have a lowering influence on the vitality of the internal tissues, excites irregular contractions on the surface of an exposed muscle.

In cases of protracted phthisis, or other diseases attended with exhaustion of the vital power and emaciation, contraction of the muscles arises with increased facility, and may be visibly excited by a light blow upon the muscles of the thorax.

And during vigorous life, the stimuli which best excite the action of the muscles are precisely those which most powerfully evoke their inherent tendency to change of composition. The nervous force has been shown to stand in a special relation to such change. Electricity, which as a muscular stimulus ranks second to it in power,

stands first among the physical forces as a promoter of chemical change, and manifests its opposition to the vital force by the instant death which accompanies its excessive action; by the coldness, pallor, and depression of vital energy which follow its local application in a powerful form; and the more speedy putrefaction of muscles which have been electrified immediately before or after death.[1]

The phenomena of post-mortem contraction of the muscles are, perhaps, not strictly comparable with those of their living action. It may be doubted whether they are facts of the same order; but so far as the former are available for illustration of the latter, they entirely support the view that contraction depends upon a diminution of the vital resistance, allowing to a limited extent the play of chemical affinity.

The simplicity and adequacy of this theory are well exemplified by its bearing upon the dynamical problem involved in the motion of the heart. Of the various extraneous forces to which the maintenance of its action has been assigned, all have been rejected by Dr. Carpenter, who prefers to regard—

"An alternation of contraction and relaxation as the characteristic and constant manifestation of its vital activity. . . . Just as the Leyden jar," he adds, "may be so charged with electricity as to discharge itself spontaneously, so it is easy to conceive that a muscle may be so charged with motility or motor force as to execute spontaneous contractions."[2]

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[1] The varying effects of electricity upon the muscles according to the direction of the current and other circumstances, are perhaps not yet entirely explicable upon any general principle. It is believed that they are not more difficult of explanation upon the view maintained above, than upon any other hypothesis.

[2] Human Physiology, p. 476.

A few considerations will show that this hypothesis cannot be accepted as a correct representation of the action to which it relates.

For, in the first place, the motion of the heart or any muscle (as Dr. Carpenter himself represents the case) is not a *manifestation* of the vital force, but a *conversion* of it. And such conversion cannot occur without a preceding change in the conditions under which the force exists. To suppose it to take place spontaneously, is to suppose a material change to originate itself; an effect without a cause.

Again, the words "motility or motor force" are most unhappily wanting in precision; and whether they be held to mean actual motion, or capacity for motion, the idea seems to be alike inapplicable.

The illustration, also, adduced by Dr. Carpenter, does not assist his argument. In the Leyden jar, electricity received from without is accumulated by resistance, and transmitted when the resistance ceases, either being neutralised by the use of the discharger, or overpowered by the excessive accumulation of the resisted electricity. That is, as if a real momentum of motion were imparted to the muscle, and stored up within it by resistance, until it had accumulated to a sufficient intensity. But the heart, on Dr. Carpenter's view, is in no such case: no account is taken of any force resisted; the entire process is a continuous development of one force, suddenly altering its character and mode of operation.

The deficient element is the force which determines this sudden change from a form of action which builds up the living tissue to one that disintegrates and destroys it. The chain is broken at that point; but the recognition of the two forces which inhere in every part of the animal body, at once supplies the wanting link. The

heart, like every living muscle, is charged with force, not motor or contractile, but chemical. The chemical affinity of its elements, resisted by vital or nutritive action, accumulates within it, creating a state of tension and proneness to action, precisely such as exists in the Leyden jar. The comparison is just, though incorrectly used. Muscular contraction from a stimulus is the analogue of the electrical discharge by means of metallic contact, in which the resistance is removed; and the spontaneous contraction of the heart is parallel to the spontaneous discharge which ensues when the resistance is too weak.

An adequate account of the facts appears to be conveyed by the following statement. In the muscular structure or nervous ganglia[1] of the heart, the chemical and vital forces are so balanced, that they assume a state of alternating activity. It might be said that the vital force exists in large quantity, but of low intensity. Hence, when, by the process of nutrition, the chemical affinity has been accumulated to a certain amount, it overpowers the vital resistance, and that chemical change which is the cause of contraction ensues. And the same series of changes continually recurs, because the vital state is constantly renewed. It is possible that the maturity of the cells which constitute the muscular fibre, being accompanied by a failure of their vital power, may give the occasion for the ascendency of the chemical force; but the phenomena of voluntary muscular contraction, and the fact that the heart's action is often more rapid in proportion to the debility of the vital power, seem opposed to such a view. The action may be roughly compared to the alternate formation and

[1] There are many circumstances which favour the idea that the action of the heart is dependent upon the ganglia contained in its substance.

decomposition of the ammoniuret of mercury in the course of an intermittent electric current.

In the foregoing remarks, it has been assumed that the vital force is characterised by a varying intensity of action. In proof of this law, it is sufficient to refer to the normal succession of the sleeping and waking states. The heart may be said to wake and sleep with each recurrence of its beat.

With regard to the mode in which chemical change of the muscular tissue effects its contraction, nothing certain is known. There is no difficulty, however, in the conception of such a causal relation, since the production of mechanical force by means of chemical action is one of the most familiar of facts, and the muscular structure may, without any violence, be regarded as a mechanism adapted for the development of mechanical effects from slight changes of composition.

III. With regard to the process of secretion, there is ample evidence that it depends upon a modified exertion of the *chemical* affinities. The following facts may be referred to:—

1. The lower composition of the secreted fluids. In the case of the great mass of the secretions, including those of a nutritive character (as the milk), this less vitalised constitution is evident, and the seminal fluid, there is reason to believe, is no exception. To what, *e.g.*, but an exercise of chemical affinity can the formation of sugar by the liver be referred?

2. The dependence of the secretive action upon the same stimuli and general conditions as the other functions, and especially upon the nervous force.

3. Its promotion by the local application, or presence in the blood, of medicinal or other substances, the influence of which cannot increase, but must tend to diminish the

vital resistance of the organs. It is not unlikely that in some instances the secretive action is normally maintained by the decomposing influence upon the gland tissue of substances, themselves in a state of decomposition, circulating in the blood.

4. An over-stimulation of secretion leads directly to destructive and anti-vital changes. Thus, as Mr. Paget has observed, the first stage of inflammation appears to be merely an increase of secretion. Salivation runs on to ulceration. One effect of destructive agents applied to the surface of the body, as a burn, severe pressure, or chemical irritants, is to induce secretion.

5. Professer Graham has rendered it probable that the passage of osmotic currents through animal membranes is dependent upon slight decomposing changes taking place in them.

6. Secretion may continue after death, being then analogous to the post-mortem contraction of the muscles.

The production of electricity and of light must be enumerated among the animal functions, but it will be sufficient merely to allude to them. There is no cause to which they can be referred with more probability than to chemical changes in the electrical and luminous organs. And the generation of electricity is known to be determined, like the other functions, by any stimuli which tend to overthrow the chemico-vital equilibrium, either in the organs themselves, or those portions of the nervous system which supply them.

The view of the vital functions advocated above has many important bearings upon special branches of physiology and pathology, which cannot now be enlarged upon. The great advantage which seems to result from it is the simplification it effects in the conception of the vital force itself. One whole division of what under other

views is c- sidered as vital action, being thus transferred to the do in of chemical agency, the idea of the vital force stands out clear and distinct before the mind as the peculiar molecular action which forms and nourishes the living body. That is its nature; that its entire scope. Thus, by resistance, it accumulates chemical force, and furnishes the conditions which THE FUNCTIONS— motion, nervous action, s —exhibit themselves as the results of chemical

And the idea of the body, the fundamental conception or plan on w as been framed, appears to be simply that on v ourselves act when we wish to construct a mac e use one modification of force as a resistance t , privileged herein with the power of imitating, at nfinite distance indeed, the sublimest of the material works of the great Creator of all things.

And further still, this view of life opens to us yet another indication of the unity of principle that binds creation into one. On earth we see the antagonism of two forms of force yielding a well-nigh boundless variety of beautiful, useful, and happy action in the successive grades of animal existence. In the heavens, the antagonism of two forms of force develops the regular motions of the planets, and constitutes the law which ordinates the universe.[1]

[1] I have perhaps failed to indicate with sufficient clearness that the production of functional action by chemical change depends upon the mode in which such change takes place. It is not every decomposition in the living body that necessarily results in a function, but such changes only, and changes of such intensity, as are adapted to act upon the functional mechanism. In a steam-engine it is not every possible expansion of the steam that causes a revolution of the wheels, but only an expansion which takes place in a sufficient and yet limited degree, and in a special direction. In the animal, passive decay of the tissues, as of an unused muscle, and excessive decay, as in some forms of disease, do not cause, but abolish, function.

XXIV.

ON PHYSICAL MORPHOLOGY, OR THE LAW OF ORGANIC FORM.

1858.

In studying the development of the mammalian ovum my attention was struck by the form in which the laminæ dorsales make their first appearance. The layer of cells which constitutes the germinal membrane being completely formed, and separated at one point from the enclosing membranes, the laminæ dorsales rise up in this portion as two parallel ridges or folds. The thought suggested itself to me that interstitial increase of the germinal membrane, under the limiting influence of the external capsule of the ovum, must result in a folding of the membrane upon itself just in some such manner. If a flexible layer increase in length while its ends remain at the same distance from each other, it is wrinkled up; by laying a handkerchief on a table, placing the hands firmly upon it at a short distance apart, and gradually approximating them, such folds may be produced.

The idea thus suggested to my thoughts led me to further investigation, and many instances soon presented themselves in which the forms assumed by developing structures seemed at least to be distinctly traceable to the mechanical conditions that were present. The law which prevails so generally in the vegetable world, that

buds are formed in *axils*, occurred to me in this light. For an axil is an interspace, a point of separation, at which the resistance to the outgrowth of the plastic material might naturally be supposed less than at other portions of the stem. Following this clue, I perceived that the conception of gemmation in axils appeared applicable, to a large extent, to the processes in which development consists. The eye and the ear bud out in the interspaces between the primary divisions of the encephalon; the vascular lamina is formed between the two layers of the germinal membrane; the allantois insinuates itself between the layers of the amnion, while the amnion itself and the ventral laminæ repeat the process observed in the formation of the laminæ dorsales.

Everywhere I met with facts of the like apparent significance: the coiling up of the intestines would be a simple result of the greater length of the bowel than of the cavity in which they are contained, and answers to a series of such foldings as I first referred to; the convolutions of the cerebrum would necessarily arise from the expansion of its surface within the cranium.[1]

Instances of this kind, multiplying indefinitely in whatever direction I looked, and becoming more convincing the more carefully they were examined, there was gradually forced upon me the perception that all organic form was determined by simple mechanical conditions. Which conclusion, startling as it appeared on its first enunciation, I had no sooner clearly grasped, than I perceived it to be self-evident. It presented itself to me thus:

Organic form is the result of motion

Motion takes the direction of least resistance.

[1] This has been observed by Mr. Solly in his work upon the Brain.

Therefore organic form is the result of motion in the direction of least resistance.

This is the position which I now propose to illustrate and maintain.

Organic form is the result of motion. By this expression nothing more is meant than that, as we consider form to depend upon the position of the particles of which any body consists, so, in the case of organic bodies, these particles must have assumed their various positions by moving into them. I use it as a postulate in this abstract statement, because it is the simplest formula I can find to express our necessary conception of the facts.

That motion takes the direction of least resistance also is an axiom. It is involved in the meaning of the words; for by resistance is meant that which *preventing*, thereby necessarily *directs*, the motion.

It is necessary, however, to notice an ambiguity which may here present itself. Motion doubtless takes the direction of least resistance, but every motion must have an original direction, and a momentum which enables it to overcome a greater or less amount of resistance. Do these circumstances detract from or destroy the value of the axiom?

Certainly they do not practically. Mechanics, as an art, reposes on it, and with none the less certainty or success because these conditions have to be remembered.

Nor does the axiom appear to me to be even theoretically defective. It is true every motion must be in a certain direction, but this direction must have been assumed under the operation of the same laws as determine its subsequent course. We here, as in every case, strike upon a chain which has to the human intellect no beginning. Whatever we may suppose concerning the primary origination of motion, of every motion that we

can perceive or conceive we must say that it is such as it is because motion takes the direction of least resistance. And the fact that impulse or momentum *overcomes resistance* only reminds us that we are apt to use the word resistance in too limited a sense. For what is it that resists motion but force? and what is force but that which, if unresisted, produces motion? It is therefore motion, or the cause of motion, that is the true resistance to motion. Thus we include the momentum of the moving body among resistances to be considered, and the axiom has the utmost logical completeness. An opposing force deflects or changes motion, or is overcome by it according to whether it be greater or less than the force to such change or deflection presented by the momentum. For the momentum clearly becomes a *resistance* in relation to such change or deflexion. If it were not so, indeed, the axiom itself would be unmeaning.

These few remarks may sufficiently guard against a misconception of the general statement which I have introduced thus broadly. Fortunately there is the less need to dwell upon such speculative views, because the position to be established is a matter of fact and demonstration.

It is remarkable that, in the various hypotheses which have been framed to account for the forms of organic bodies, no attention has been paid to the fact that they are formed, as it were, under pressure; that the process of expansion in which growth consists takes place under conditions which limit it in definite ways. It must surely have been from overlooking this circumstance that a mode of speaking has established itself among us, as if there were in the organic tissue a power of forming itself into peculiar shapes; as if masses of cells, by some power

of their own, could mould themselves into complicated structures. How strangely all such modes of speaking (howsoever they may be disguised, or whatever specious terms may be called in to conceal their nakedness) are at variance with all the principles which are held in regard by us who use them, whether as students of Nature or as professing to recognise a higher agency than Nature's, it is needless to point out. It suffices to show a way of escape from them. For it is certain that such assumptions would never have been tolerated either in our words or in our thoughts, if we had not been driven to them by our inability to refer the phenomena to demonstrable or intelligible causes, such as science, properly so called, concerns herself with.

I say, therefore, that a release from the imagined necessity of assuming such inherent virtues in organic bodies is afforded by two simple facts—1st, that the increase in bulk of developing structures takes place under resistance; and 2dly, that we can, in very many cases, trace the forms assumed by organic bodies, or parts of them, to the operation of the ordinary mechanical laws taken in connection with other conditions known to exist.

In some instances it has been found impossible to ignore this relation of morphological changes to mechanical conditions, in spite of opposing hypotheses. In the case of the ovum, for example, the cells of the germinal membrane are said to become apparently hexagonal by mutual pressure, arising from the increase of the mass. Doubtless this is natural and true; we could not force ourselves to attribute this change of figure to any other cause. But if this be so, does not the folding of the membrane into laminæ stand in an equally simple relation to pressure from increase of mass? And if some laminæ, why not all? The admission of mechanical

conditions a normal agents in morphological change, in any one instance, involves the necessity of taking them into consideration in all, and of admitting no other agents except in cases in which these are demonstrably insufficient. How entirely this principle has been neglected it is curious to reflect, nor perhaps does the history of the human intellect furnish a more striking example of the power of an hypothesis to pervert thought and deaden observation. So intent have men been on pursuing the specific vital tendencies, that the final causes manifested in the uses of the parts have been overlooked, and it would appear as if we had entirely forgotten that matter is matter after all. "The tail (of the tadpole) which was previously employed for locomotion, becomes useless, *and falls off!*"[1]

Perhaps nothing has contributed so much to divert attention from real to hypothetical causes of morphological change, as the fact that structures entirely alike to the eye, and under analogous external conditions, undergo very different changes. This is especially the case in the development of the ovum, which being alike in almost all animals, so far as we can observe, is yet the parent of the boundless diversity of form that animated nature exhibits. No theory has seemed capable of accounting for this fact but that of a peculiar power

[1] Agassiz and Gould's Comp. Phys., p. 343. Bacon's warning has not yet lost its bearing: "To say that the hairs of the eyelids are for a quickset and fence about the sight; or that the firmness of the skins and hides of living creatures is to defend them from the extremities of heat or cold; or that the bones are for the columns or beams, whereupon the frame of the bodies of living creatures is built; or that the leaves of the trees are for protecting of the fruit; or that the clouds are for watering of the earth; or that the solidness of the earth is for the station and mansion of living creatures, and the like, is well inquired and collected in metaphysic; but in physic they are impertinent. Nay, *they are indeed but remoras and hindrances to stay and slug the ship from further sailing, and have brought this to pass, that the search of the physical causes hath been neglected and passed in silence.*"—**Advancement of Learning, Book ii.**

inherent in each germ; yet when the phenomena are contemplated simply, and without such haste to refer them to their cause, the mystery becomes much less, and even disappears. For, what though the appearance to the eye, and even to the microscope, of all ova be the same, is it not certain that there is a difference of structure which escapes our observation? Nay, does not the ascription to them of different powers involve that very difference of structure or composition which it is supposed to supersede? And what can be simpler than that germs of different *structure* should, under like circumstances, undergo different changes? It is to be considered, also, that the external conditions of the ova of different animals are not precisely alike; they have only a general correspondence, while the nutritive materials and the molecular changes on which the process of growth depends also present differences in each case. Would it not be time enough to invent specific powers when these known conditions have been proved insufficient? Add to all this that each change of structure in the process of development modifies all the succeeding ones, and it becomes no longer hard to understand how, from even imperceptible incipient diversities, the widest contrasts of form may accrue. Every divergence is continually multiplied.

But how come the germs to differ? Clearly because formed under differing conditions. They are diverse, because their structure is the result of motion in the direction of least resistance. There is no *beginning* in a germ.

I shall proceed to mention some instances in which the production of organic forms by motion in the direction of least resistance has struck my own attention. But I do not design to make a formal induction of such

cases, still less to present the evidence on which the proposition rests. That no man can do, for such evidence must embrace nothing less than every living form. The proof for each man must be his own observation, the testimony of his own senses. Let any person who wishes to put it to the test take any developing part of a plant or animal, and watch the process. Let him endeavour to trace the causes which determine the form that is assumed, and see whether it be not the fact that the expanding tissue adapts itself to the mechanical conditions that are present, just in such way as any other expanding substance of similar consistence would do. He may not in very many cases be able to succeed in this examination, the process may be beyond his grasp; our means of exploration must be greatly improved before it can be otherwise; but before even the most moderate attention these cases become daily fewer.

It may be objected here, that in manifest instances development takes place in the direction, not of the least, but of the greatest resistance, as in the growth of the root beneath the soil. Such cases constitute a class of facts most necessary to recognise; but a little reflection suffices to show that they do not, as indeed they cannot, affect the principle.

The growth, or expansion, must exist before any question can arise of the direction it shall take; the molecular actions which result in organic increase must be presupposed. Now, these molecular actions come into operation under laws which are unquestionably fixed and determinate, and which it may not be impossible to ascertain, but of which no theory is attempted here. In the germinating seed the vital action commences first, and exists most powerfully in the radicle; the root, therefore, has the first tendency to grow. From this

point the application of the morphological law commences.

It is the more necessary to bear in mind this consideration because it is of constant application. In almost all cases of growth or development the vital action manifests itself in some parts rather than in others; it exhibits foci, as it were, of greatest energy. It is only by duly marking these that the effect of the mechanical conditions in determining form can be appreciated.

In truth, however, the formation of the root furnishes a beautiful illustration of the law of least resistance, for it grows by insinuating itself, cell by cell, through the interstices of the soil; it is by such minute additions that it increases, winding and twisting whithersoever the obstacles it meets in its path determine, and growing there most where the nutritive materials are added to it most abundantly. As we look on the roots of a mighty tree, it appears to us as if they had forced themselves with giant violence into the solid earth. But it is not so; they were led on gently, cell added to cell, softly as the dews descended, and the loosened earth made way. Once formed, indeed, they expand with an enormous power, but the spongy condition of the growing radicles utterly forbids the supposition that they are forced into the earth. Is it not probable, indeed, that the enlargement of the roots already formed may crack the surrounding soil, and help to make the interstices into which the new rootlets grow? Nor is there any good reason for assuming that the roots encounter from the soil a greater resistance to their growth than the portions of the stem meet with from other causes. We must not forget the hard external covering of the parts exposed to air and light.

Like this are the cases in which fungi grow up beneath great pressure, which they overcome. The opposition to

the law east resistance is here also only apparent. The plant is altered in form in proportion to the pressure on it, if it be great; and manifestly the pressure is overcome precisely when the resistance to growth in any other direction, arising from causes in its own structure, becomes greater than such pressure. It is impossible even to think otherwise ress the contrary without uttering a contradicti are naturally prone to under-estimate the force y molecular actions as compared with those r l agencies which more directly present themsel e to our sensations.

Throughout almost th of organic nature the spiral form is more or tinctly marked. Now, motion under resistance spiral direction, as may be seen by the motion of a body rising or falling through water. A bubble rising rapidly in water describes a spiral closely resembling a corkscrew, and a body of moderate specific gravity dropped into water may be seen to fall in a curved direction, the spiral tendency of which may be distinctly observed. Theoretically, the explanation of this fact is very simple: the motion of the falling body being resisted, is deflected or turned at right angles,[1] and a motion constantly turned at right angles, and yet continuing, is a spiral. In this prevailing spiral form of organic bodies, therefore, it appears to me that there is presented a strong *prima facie* case for the view I have maintained. Parts which grow freely, as the horns of animals, and the roots of plants when caused to grow in water, often present the spiral form in great perfection; if a thread be uniformly wrapped round the buds of a tree in early spring, so as to prevent their expansion, they will frequently grow into a spiral. The spiral form

[1] In theory it might not be deflected if both the body and the medium were perfectly homogeneous, but in fact the deflection is certain to occur.

of the branches of many trees is very apparent, and the universally spiral arrangement of the leaves around the stem of plants needs only to be referred to. If now we examine more deeply, the spiral form may be traced with scarcely an exception in every organ of the body. The heart commences as a spiral turn, and in its perfect form a manifest spiral may be traced through the left ventricle, right ventricle, right auricle, left auricle, and appendix. And what is the spiral turn in which the heart commences but a necessary result of the lengthening, under a limit, of the cellular mass of which it then consists? it is just such a folding as constitutes the laminæ in the germinal membranes, as one of which laminæ or wrinkles, indeed, it may at its first appearance be regarded. The intestines fold themselves, by similar increase under resistance, in like manner into spirals; the head is formed by a turning of the anterior extremity on itself. The entire embryo, indeed, takes half a spiral turn, being twisted so as to lie with its side upon the yelk, the heart being on that side, so that of the mammal we may say that it represents a left-handed spiral.[1]

It would be tedious to go through the cases which illustrate this point, for indeed it is one process that is observed in all. Is there any organ which does not commence thus, a ridge, a lamina rising up, a turning at right angles, an increase under limitation, of which that first lamina dorsalis may be taken as the type? In the adult frame, is there any part that is not spiral more or less decidedly? The spinal column describes a spiral from the pelvis to the skull; the ribs have every one of them a spiral twist; the skeleton of the arm and leg are

[1] See Glasgow Medical Journal, July 1853. Dr. A. Thomson on a case of Transposition of the Viscera. The opposite direction of the spiral in the animal and vegetable worlds is very interesting.

spiral, though but slightly; the hand and foot are each an expanded spiral. The very meatus of the ear winds spirally, and the tympanic bone of the fœtus describes a spiral turn. The resemblance in form of the ramifying organs to those of the vegetable kingdom is too obvious to be insisted on. In the lower forms of the animal world the spiral form is more plainly evident than in the vertebrata.

Every one must have the peculiar curling up of the young leaves of the fern. The appearance is as if the leaf were rolled, but in truth this form is merely a phenomenon of growth. The curvature results from the increase of the leaf, which is only another form of the wrinkling up, or turning at right angles by extension under limit.[1]

The rolling up or imbrication of the petals in many flower-buds is a similar thing; at an early period the small petals may be seen lying side by side, afterwards growing within the capsule, they become folded round one another. It appears to be thus also that many cavities are formed in organic structures; the ovaries of plants, for example, into which, then, we may easily understand that the ovules should gemmate, even as the viscera into the cavities of the thorax and abdomen. Thus, too, the lateral ventricles of the brain appear to be formed, the hemispheres in their expansion rise up and leave a central hollow like the fern leaf; nor should we omit to notice that this cavity has a distinctly spiral form. The bulgings in the large intestine between the bands of muscular fibres, are a simple instance of the same thing. As hollow protrusions from the brain the organs of sense arise.

It is hardly necessary to point out how simply the production of septa, which forms so important an element

[1] This was kindly pointed out to me by my friend Dr. Gull.

in development, comes within the scope of this principle. They are but laminæ rising up; ridges from extension turned at right angles. From the septa of the heart we may pass to the valvulæ conniventes of the intestine; they are palpably one fact, the difference is of degree. The corpus callosum, and perhaps other commissures of the brain, are the same thing, and in the corpus striatum and optic thalamus may we not recognise bulgings formed on the same principle upon the crura cerebri?

I cannot resist the temptation that arises in this connection, to suggest a theory respecting the striæ in voluntary muscles. According to Mr. Savory,[1] those markings commence at the boundaries of the fibrils, and proceed gradually to the centre. Now, precisely this appearance would result if the internal layer of the wall of the fibril greatly increased in length; it would inevitably be raised in folds which would pass inwards from each side, and might meet in the centre, as do the septa of the heart or new vessels in forming parts. This, however, is but theory; it has only in its favour the simplicity, and the great frequency in other parts of the body, of the process which it supposes. We see it constantly in the subdivision of cells by the bending inwards of their walls.

Here are a few instances in which I think I have seen the effect of mechanical conditions in determining form. The strawberry-leaf consists of three leaflets, of which the central one is symmetrical, the lateral ones unsymmetrical. If it be examined before it unfolds, the cause of this difference may be traced; the lateral leaflets, each folded on itself, are placed in contact side by side, the effect of which is, that the inner portion of each is truncated as it were; being covered in by the

[1] Philosophical Transactions, 1856.

outer, it has not room to grow to an equal size. The central leaflet is free, and expands equally on each side.

If a flower-bud be opened at a sufficiently early period, the stamens will be found as if moulded into the cavity between the pistil and the carolla, which cavity the anthers exactly fill; the stalks lengthen at an after period. I have noticed also in a few instances, that in those flowers in which the petals are imbricated, or twisted together, the pistil is tapering as growing up between the petals; in some flowers which have the petals so arranged in the bud as to form a dome (as the hawthorne, *e.g.*), the pistil is flattened at the apex, and in the bud occupies a space precisely limited by the stamens below, and the enclosing petals above and at the sides. I have not, however, satisfied myself that this holds good in all cases.

I have endeavoured to trace the formation of the pea within the pod. It seems to take place thus: the seed grows into a cell containing fluid, springing up, from the point of attachment of such cell, by a narrow pedicle which expands as it increases, and divides into the two cotyledons. In the interspace between these is formed the plumule, which is thus but the first "gemmation in an axil." Should we not conceive the plumule to be formed, when the resistance to the increase of the lobes of the seed is greater than that to a growth from the axil between them? When made to germinate in water the radicle lengthens and bursts the containing capsule, assuming a spiral twist, then the plumule gradually increases also, but in less degree, rising up into an acute curve before its extremity is free from its position between the cotyledons. Simple as it is, nothing can better illustrate the nature of those folds, elevations, or turnings at right angles, in which almost all the organs

of the body have their origin, than this curving of the plumule as it grows, its free end being fixed by the pressure of the cotyledons; it is increase under limit.[1]

Mr. Tyndal, in discussing the movements of glaciers, relates some experiments, which go to prove that pressure causes a splitting or lamination in ice and other plastic substances, at right angles to the direction in which it is applied.[2]

It is difficult to avoid connecting this fact with some of the phenomena of organic development in which lamination, or the splitting of a mass into parallel layers, occurs so frequently, and plays so large a part. Consider the division into two layers of the germinal membrane which takes place only in the vertebrata, animals destined to a comparatively high development; the lamination of the plumule of the seed, the leaf-bud of the plant. In reflecting on the cause of these things, do not our thoughts involuntarily recur to the pressure that continually arises, must arise, in the growing tissues? What shall we say of the primary cleavage of the yelk in directions at right angles to each other?

In endeavouring to trace morphological change to its causes, we cannot overlook the very striking connection between growth and decomposition in developing organisms. Continually in the ovum the central portion of the germ mass liquefies, while the circumference develops, one portion seeming to serve as food to another. It is thus that the vascular system is chiefly formed, the walls assuming consistency as the central parts are dissipated. Surely it is not a mere fancy that

[1] So powerful an influence has mechanical pressure on growth that, as stated by Mr. Lindley, those endogenous trees of which the external layer cannot expand, are stopped in their growth by the resistance which is thus opposed to the formation of the new bundles of fibres.

[2] Westminster Review, 1857.

finds in this decomposition one source of the *force*, which produces the growth of the adjacent parts. To remember this relation of decomposition and growth would render simple many things in the living body that are otherwise mysterious. Let it be conceded that where there is decomposition there is a source of force which may be manifested in the production of *vital* change, and a flood of light is poured upon development. For decomposition is a process ever apt to occur, and it is a known result of pressure. "The cells in the embryo sac," says Dr. Carpenter, "deliquesce again as the embryonic mass increases in bulk and presses upon it." [1]

If such decomposition, besides producing growth, tend also to increase the bulk of the organised mass (and what can be more certain, when we consider the gaseous nature of some of the organic elements), certain processes in development are seen to be perfectly intelligible. Take, *e.g.*, Dr. Carpenter's account of the fertilisation of the plant. I conceive a process of decomposition is set up in the pollen, when it falls upon the stigma.

"The pollen grains fall upon the stigma and begin to absorb the viscid mucus which bedews its surface. In consequence of this absorption, the inner membrane or proper cell wall becomes distended, and either breaks through the thinner points of the external envelope, or pushes this before it so as to form one or more long slender projections, which are known as the pollen tubes. These insinuate themselves among the loosely aggregated cells of the style, and grow downwards until they reach its base, a distance in some cases of several inches. Arrived at the ovarium, they direct themselves towards the micropyle of the ovules, and entering these they make their way towards the embryo sac, usually through a channel formed by the diffluence of a sort of cord formed of

[1] General and Comp. Phys., Third Edition, p. 898.

peculiar cells that previously passed from the apex of the embryo sac to that of the mammillary protuberance of the nucleus."[1]

Just such, again, is the germination of the seed: the decomposition of the albumen produces at once vital action and expansion, and growth takes place first in the radicle, then in the plumule, these being the directions of least resistance.

May not the curious fungus which forms in certain caterpillars be classed with these? First occupying the body of the animal, it finds its way out as it increases always at the junction of the head with the body, the direction of least resistance.

My conception of the nature of these changes is illustrated by the fact that separated portions of cactus will grow and increase in size while they gain no increase of weight. The starting-point here I take to be a decomposition analogous to that which takes place in a germinating seed.

Does not the power of repair resolve itself into an instance of growth in the direction of least resistance? Is not a wound an axil? and the granulations which form in it, or the new member which grows in the place of a lost one, do not they correspond to the buds which form in axils in the growth of plants or the development of the embryo? The solution of continuity removes the resistance of the external investiture. Is there, therefore, any basis for the supposition of a special power by which a living body can recover itself from accident or injury? The law of its formation involves its repair. So if some leaves be incised, buds spring up from the cut surface; the hydra gemmates from a wound. These are artificial axils. I do not mean to imply that no other circum-

[1] Op. cit., p. 896.

stances are to be regarded in relation to the reparative process. Irritation, of whatever kind, produces special modifications of the vital action, but I suggest that the general fact of the repair of wounds is an illustration of growth taking the direction of least resistance. The new material is deposited where the resistance to expansion is removed; is it not deposited there rather than in other portions of the body, because the resistance at that point is least? We know that repair is effected at the expense of the general nutrition, and we know, too, the effect of scabbing, or pressure otherwise applied, in limiting the process of granulation. Perhaps I may state the case thus: if growth take the direction of least resistance (other circumstances being the same), then it is certain that wounds must be repaired.

In truth an entirely new conception of homology arises out of the recognition of a LAW OF FORM; a parallelism of various organs, according to the dynamical conditions exhibited in their morphology, which embraces all parts of all bodies, and extends itself through the whole of organic nature. On this point I will confine myself to one suggestion. Observe the form of the intestinal canal (I speak of the mammalia), straight for a short distance from its orifice, then convoluted, then terminating in an expanded portion, the stomach. Compare this now with the form of the tubuli in the kidney—a straight portion, a convoluted portion, an expansion, the Malpighian corpuscle. Again, take the nervous tubules in the brain; there is a straight portion, the white substance; is not the grey matter a convoluted *cortical* portion (like that of the kidney), and are not the cells intermingled with the convoluted fibres expansions, not without a formal resemblance to the Malpighian bodies? I do not wish to erect any strainalogy; perhaps this is a dane fancy alto-

gether, but to my mind there is indicated by this similarity of form a similarity of mechanical conditions not without its interest.

Development, then, is due to increase under limit; it is determined by resistance. Is it not self-evident? Conceive an ovum germinating with all other circumstances unaltered, but with no external limitations, no membranes, no uterus, nothing to check expansion in any form. Could anything else result but a shapeless multitude of cells? But if it be so, let us fairly face the position that we take. The mechanical limitations must act mechanically, and *form* be the result of mechanical conditions. Consider how every organism intended to develop is subject to external resistance, the tough capsule of seeds, the shell of eggs, the womb of the vivipara. Are not the marsupials and monotrems which escape so early from the uterus less developed than animals whose gestation is more prolonged? Think of the firm sheath of every muscle, the capsule of every viscus, the bony case of the nervous system; remember how every free surface in the body is covered with cells, and with cells alone. If the membranes of the brain be divided, a cellular fungoid growth protrudes; is it not that the maintenance of the organisation of the brain demands the resistance of its coverings?

Using the term "uterus," therefore, to denote a definite external resistance to extension, is it not an axiom that *everything is* DEVELOPED *in a uterus?*

It should be remarked here that the forms of parts of animals are often greatly altered, after their first development, by growth under conditions different from those in which the development takes place. Growth modifies the form which development primarily determines; the body moulded within the uterus, expands freely there-

after without external resistance. Hence the result is changed, but not the law. A single instance will make clear my meaning: in the early bud the anther constitutes the entire length of the stamen; as the flower expands the stalk has room to grow.

There is one other class of cases to which it is necessary to refer; those, namely, in which the form immediately results not from extension or expansion, but from wasting; an extreme instance of which is presented in the cellular formations during the pith of plants. Indications of such relations are of great frequency in the animal body, even in the higher grades of development, but this single illustration may suffice for them here. It is clear that the law of least resistance, which means no more than that mechanical conditions determine mechanical results, applies equally to them. The wrinkling up of the lining of the corpus luteum, partly we may be sure from the contraction of the capsule, is a marked example.

If it should be remarked that there exist in developing structures certain definite modes or operations of force, such as attractions or repulsions in particular directions, which serve to determine the form assumed, apart from any influence of the visible mechanical conditions, this is willingly admitted to be true. The morphological law suggested does not contravene, but rests upon, these phenomena. They may be regarded in two ways; either as constituting part of the molecular process in which nutrition consists, as instances of those local manifestations of growth before referred to, and which are presupposed as the foundation on which the law is based; or perhaps more properly they may be themselves considered as coming within its scope. In so far as these changes consist in the motion of particles, the law

of least resistance may be asserted of them, or at least cannot be denied. Such molecular changes, indeed, form no portion of the evidence on which the proposition can be based, inasmuch as the nature of the process and all its conditions are as yet beyond our investigation. But that in so far as they consist in motion they conform to the nature of motion, we may be quite sure. The *structure* of the germ must be such as to determine the operation of whatever chemical or other forces come into play within it, to produce motion in these particular directions.

This, then, is my argument. The illustrations I have adduced may be insufficient, or unsatisfactory, or false, or misconceived, but no defect of this kind in the proof can affect the proposition; for it rests upon necessary laws of thought. Physical morphology is like an applied geometry; if I have failed in the application, others will certainly succeed.[1]

Resistance to motion is of necessity an opposing force; force and resistance are indeed interchangeable terms, two aspects of the same thing, as when the two hands are pressed together, each mutually resists the force applied by the other. Viewed in relation to this law of least resistance, therefore, the idea of organisation is beautiful. It is the result of motion in the direction of least opposing force. Certainly: how should it be anything else? Is not organisation a perfect mutual adaptation and exact conformity to each other of all the parts, even to the minutest details, an absolute rightness and order? And how should this be attained except through

[1] It may be urged that in magnetism and other forces, and in human actions, we have instances of motion to which this conception of least resistance is not applicable. It would be too great a licence to enter on a discussion of these matters under cover of an inquiry into organic form; but it appears to me that, *in so far as they come within the domain of the physical*, the conception of least resistance as determining the form and direction of the action is neither inapplicable nor infertile in results.

motion in the direction of least opposing force? What else is this law of motion but that exact rightness seen from the human point of view? Does it not mean that each minutest part determines the being of every other, a perfect mutual interaction and subordination, a rightness from the very first, and through every step, that must end in a completed rightness at the last? Let us try to think of this, freeing our minds from preconceptions. How can there be other than perfect order and adaptation in that organisation in which each part has had its equal share in the moulding of the whole? There unity must be, and beauty, and most exquisite harmony, for there law has been perfectly fulfilled. What else is it than that each particle of the growing organism goes where it is most wanted (as *we* might say), where there is most room for it; it is like water finding its level, the very idea of exact adjustment. Manifestly it involves the existence of specific forms, such as we see, and forms maintained and repeated as we see. Constancy of forms means constancy of conditions.

Contrast with it any other supposition respecting vital forms. What of a specific tendency to a definite form in each animal? Is not that as much like "Nature abhors a vacuum" as we can well conceive? Is it anything but a deceptive formula, used to give an appearance of accounting for that which is in truth a mere matter of observation wholly unaccounted for? Not to mention that it supposes something to *act* before it *is*, is it not open to the practical refutation that the case is not as stated? Nature only abhorred a vacuum to a certain and a variable extent, so do living things assume a definite specific form only to a variable degree of accuracy. Monsters and deformities of all kinds disprove the hypothesis altogether. Besides, we know how, by artificial

means, organic forms are altered. Tie up a bud upon a tree so as to prevent its growing, and in most cases another bud, that would not otherwise have appeared at all, will be developed in its place. Is not this proof that of all possible buds in any given case, that one develops to the growth of which there is the least resistance?

And what are we to say of that revived doctrine of "Ideas," the type of which is the typical vertebra, and respecting which, if we had not profited by the experience of other ages, as fierce a conflict would arise as was ever waged between realist and nominalist of old? Let it be granted that it is an admirable means of grouping and arranging our ideas; let it be granted even indispensable, while no law was known for vital forms, no order and necessity otherwise discoverable, and therefore no ground for scientific treatment. Surely it was never regarded as satisfactory or final. There is no need to argue against the conception; until such place is claimed for it, it may well be left to die in honour when its work is done. Nor is there any fear that aught of value in the homological doctrines, for which it has served as an expression, would perish with it. They have a deeper foundation than that which has been claimed for them.

All that I maintain is involved in these words of Mr. Huxley's: "The lateral canals (of hydatina) are much longer than the body, and are *therefore* disposed in coils here and there."[1] Only let the principle here recognised be applied to every case to which it is found applicable.

Here I should cease. But it would be affectation to ignore that the view I have taken will be felt by some as contravening the design that they delight to recognise in Nature; as another step towards excluding God from His creation. I do not feel it so. I may not enlarge

[1] Medical Times and Gazette, 1856, Lecture v., p. 81.

upon this aspect of the question, but the entire subject has been so mixed up with theological ideas that I may be permitted briefly to indicate my own view. I hold all vital forms to be what we call necessary, but it is the necessity of rightness that I recognise, and no other. God's act in Nature app[illegible] us under the form of *physical* or merely passive[illegible]sity, but that is our infirmity and defect of visi[illegible] is necessary truly, every least fact and part of it, [illegible]essary by a truer, deeper necessity than we perceiv[illegible]ecessity that Love should do infinitely well and [illegible] Welcome to me are all proofs of necessity, all i[illegible]s of law, all demonstrations that things could [illegible]otherwise than they are. Never does Nature bring us nearer to God than when science excludes from it all arbitrariness, and teaches us to say, This must be as it is. For an intellectual we must learn to substitute a moral conception of creation; we need to rise above contrivance, it is holiness that claims our reverence in nature. Well said Bacon, "The three true stages of knowledge are as the three acclamations, *sancte, sancte, sancte;* holy in the description or dilatation of His works, holy in the connection or concatenation of them, and holy in the union of them in a perpetual and uniform law." Was Newton ever held to be an irreligious philosopher? Yet of him "it is recorded that whilst contemplating the simplicity and harmony of the plan according to which the universe is governed, his thoughts glanced towards the organised creation, and he remarked, 'Idemque dici possit de UNIFORMITATE EA, quæ est in corporibus animalium.'"[1]

[1] Dr. Carpenter, op. cit., p. 559.

XXV.

MR. HERBERT SPENCER'S PRINCIPLES OF BIOLOGY.[1]

UNQUESTIONABLY life is the touchstone of any system of philosophy. Not only is it in itself the most eminent fact in nature, the one which, above all others, challenges attention and puts curiosity upon the stretch; it is, to a thoughtful apprehension, much more than this. Though to a superficial view unlike, nay, in many aspects most opposed to the phenomena which lie outside the pale of organisation, life is in reality, and is, more or less consciously, universally felt to be, the most perfect exhibition of the universe to us. We might call it Nature's revelation of herself; the mode in which she delights to make known her secret meaning. Yet, if it be a revelation, it is still a hiding. If the ends are manifest, the methods are obscure. Nature seems here to put herself into our hands, and yet eludes us when we seek to hold her. Life seems close to us, and yet is far off; it seems well known, and yet impenetrable; it seems distinct from all other things, yet its roots twine about the centre. We grasp it as Thor grasped the cup that drained the ocean. It furnishes our first draughts of knowledge, but the whole depth of nature must be pierced before its mystery is exhausted.

[1] The Principles of Biology, vol. i. By Herbert Spencer. London: Williams & Norgate, 1864.

Yet that life should stand to us as the interpreter of the universe is necessary. The organic body constitutes the point at which man touches the world. It is here our consciousness and the external meet; here, if anywhere, we have direct apprehension of nature, and obtain a standard by which our other apprehensions may be judged. Nor can we, on reflection, fail to see that the distinction which exists between the organic and inorganic worlds, is grounded less on a true external difference than on difference of relation to ourselves; and that, if ever knowledge is to penetrate below the surface, the line of mechanism furnishes the clue by which we must be guided. Accordingly, we do not wonder that Mr. Spencer, in the development of the great task which he has set himself of summing up the main items of human knowledge, and ordinating them under the broadest and simplest principles attainable, has sought at once to test the value of his conceptions by their application to Biology; feeling, doubtless, not only, as he says, that it is of more immediate importance to interpret organic than inorganic nature, but also, that to interpret life is to interpret all.

Nor is the tendency of science in this respect doubtful. While, on the one hand, extended observation has been constantly eliciting new points of apparent contrast between the organic and the inorganic, on the other a more minute examination has been almost as constantly resolving them on principles of universal application. The identification of the two regions can hardly, indeed, yet be said to be accomplished, but so far as their general aspects are concerned, it seems to be approaching. And the doctrine—to which Mr. Spencer's volume furnishes a powerful contribution—that organic and inorganic nature are one, is manifestly gaining an increased ascendancy.

It is probable, however, that the march of thought on this subject, though on the whole decisive, has been much impeded by a certain one-sidedness. Almost all the effort bestowed on it hitherto has been exerted in one direction; namely, towards bringing vital phenomena into conformity with those of the inorganic world. To us it appears that this process should be at least in part reversed, and the endeavour made to read inorganic phenomena by the light of vital. We may illustrate our meaning thus. The motions of the heavenly bodies are in various respects unlike the motions which take place upon the earth; especially, perhaps, in this, that the latter never continue for more than a limited time; the former are unceasing. So palpable is the difference, that by the natural sense of men these motions were absolutely contrasted; opposed, much as the organic and inorganic have been opposed among us. By the Greeks they were called respectively corruptible and incorruptible. But they are now wholly identified; the same laws are seen to prevail in each case, under different conditions. This identification was effected by a mutual interpretation. The apparently superior celestial motions were not reduced into terrestrial; the true nature of the latter was revealed by the former. The corruptible were raised up in thought and identified with the incorruptible. It was discovered that the apparent ceasing was an illusion of the sense. The seemingly simpler were the least truly seen—the least intelligible.

So, it appears to us, it must and will be in respect to the phenomena of the organic and inorganic world. The seeming higher will not be brought down to the lower; but the seeming lower will be raised up to the higher. The celestial regions where dwell vitality will explain to us the humbler terrestrial sphere of lifeless matter. We

shall first learn to understand inorganic nature when we discern in it, though hidden, the same characters as those which seem the sole prerogative of life.

To complete our illustration, we might ask whether each class of motions—the celestial and terrestrial—did not contribute its own elements to the laws of motion: for example, the character of continuance by the celestial, that of taking a straight line until deflected, by the terrestrial? So, perhaps, the organic and inorganic spheres have each some special elements to contribute to our comprehension of the laws of force.

In the sequel we may better see the bearing of this view. We will now no longer detain our readers from Mr. Spencer—who having, perchance, by a wise instinct, pretermitted the inorganic region, may come to his subject with hands less bound—but shall proceed to lay before them a brief recapitulation of his views of life.

In order to understand the present volume it is necessary to recall the main positions laid down in the former, and some of the fundamental conceptions there given. Premising that the absolute verity of things is unknowable by us, and their actual cause wholly inscrutable (wherein lies a reconciliation between science and religion), Mr. Spencer proceeds to show, that from the fundamental ideas of matter and force—the indestructibility of which is demonstrated—the general characters of natural phenomena may be deduced. Starting from matter as a homogeneous mass, subject to the operation of force in some quite simple form (say as attraction and repulsion, or as a mere undefined motion), there must ensue a process of "evolution;" that is, this homogeneous mass must become characterised by more and more differences; the unlike portions being separated from each other, and the like portions aggregated. Thus there will arise a pro-

gressively more and more complex structure of the universe, each portion undergoing its own particular changes, connected by a widely ramifying chain of mutual dependence. In short, from the embryo universe, as above presented, must be evolved the universe which so conveniently surrounds us, but which we so imperfectly know.

This great series of changes, which constitutes evolution, arises in conformity with certain necessary laws, all of them based upon the one great axiom of the persistence, or indestructibility, of force. The first is *the instability of the homogeneous.* Since different parts of a mass, which is throughout perfectly alike, must be differently acted upon by the same force, this force will produce upon these parts different effects, and will thus modify them differently; in a word, will "differentiate" them. So the homogeneous mass will become "heterogeneous." Another law also comes into immediate bearing—that of *the multiplication of effects.* For a force operating upon *differing* portions of matter itself becomes modified and assumes different forms, again producing new differences of arrangement, which in their turn still further differentiate the forces. So, from the simple indeterminate force there arise definite movements, heat, electricity, light, chemical phenomena, &c.

Besides this ever-increasing diversity, there ensues an answering process: the like elements are grouped together, and more and more distinguished from unlike groups. This is *integration,* of which we see an instance in the successive strata of the earth's crust; and finally, the whole process tends towards equilibrium, a perfect balance of force in every direction.

Thus we find, from a mere unvaried aggregate, played upon by an unbalanced force, is evolved a mutually connected variety; or, in other words, "evolution is a change

from an indefinite incoherent homogeneity to a definite coherent heterogeneity, through continuous differentiations and integrations." And this is exactly what takes place in chief perfection in the organic world. The history of life is the history of a typical process of evolution, as this second volume is designed to show. Herein the general principles laid down in the first are applied to the special field of biology, or at least to that part of the science which concerns the wider phenomena of life. In one aspect it is a cumulative argument for the doctrine of the development of life through natural forces as opposed to that of special creations. Mr. Spencer begins with a discussion of the *data* of biology—the mutual actions between the organism and surrounding forces,—and attempts a definition of life: then, in the absence of sufficient knowledge to allow of complete treatment of the subject, he reviews the main inductions at which biology has arrived; and finally applies the gathered materials to demonstrate the process of evolution. We will attempt briefly to follow him.

It is not hard to understand that organic matter should be peculiarly unstable. Three of its four chief constituents are gaseous, the fourth a solid; all are very unlike each other, and nitrogen is especially prone to quit its compounds. Several exist in a variety of forms, among them oxygen, carbon, sulphur, phosphorus. The organic molecules consist of numerous atoms, and probably possess a spherical form, which tends to keep their polarities unbalanced. They belong largely to the group termed colloid by Graham, and thus possess tenacity sufficient for plastic purposes, and yet permit an easy diffusion through them of substances belonging to the crystalline group, which freely traverse the body; some entering as excitors of its actions, others passing out as

the results of decomposition. Some of the organic substances possess a greater molecular, others a greater chemical mobility. Upon the substance thus constituted the forces of nature are continually operating. It is changed by pressure, rapidly imbibed and gives off fluids, is modified by heat and light, and is especially susceptible to chemical influences; rapidly falls from its unstable to a stable composition under the influence of oxygen, or of changes communicated in a manner akin to fermentation. Influenced thus from without, the organic body reacts; develops heat, light, electricity, nervous force, motion, all dependent on molecular change.

For a definition of life, Mr. Spencer, admitting that any definition must be imperfect, prefers this: "The definite combination of heterogeneous changes both simultaneous and successive, in correspondence with external co-existence and sequences;" or more briefly, "The continuous adjustment of internal relations to external relations." The characters of life as thus defined are emphatically those of evolution. The highest animals present the widest, most rapid, and relatively the most prolonged series of changes; the higher the life the greater the variety of structure and of function, and the more definite the combinations or integrations. The correspondence in life between the internal and external is the establishing of a balance or equilibrium, "which ever leads an evolution to become more complete."

"On the one hand, for the maintenance of that correspondence between inner and outer actions which constitutes life, an organism must be susceptible to small changes from small external forces (as in sensation), and must be able to initiate large changes in opposition to large external forces (as in muscular action). On the other hand, organic matter is at once extremely sensitive to disturbing agencies of all kinds, and is capable of suddenly evolving motion in great amounts; that is to say, the constitution of organic

matter specially adapts it to receive and to produce the internal changes required to balance external changes."

The natural scope of biology would be a detailed interpretation of all structural and functional phenomena in their relations to the phenomena of the environment and in their mutual reactions; but this being in the present state of knowledge impossible, Mr. Spencer takes up, one by one, the chief biological inductions, analysing them and referring them to the laws of evolution, as already laid down. The inductions are: growth, development, function, waste and repair, adaptation, individuality, genesis, heredity, variation, classification, and distribution.

Growth is essentially the same in the organic and inorganic world, the growth of a crystal, for example, and of a plant; except in this, that inorganic substances, in growing, integrate with themselves such particles only as are already essentially the same as themselves; organic bodies first cause such particles to be formed from their elements, present in the surrounding medium, and then unite them with themselves. Growth is due to the surplus of food over expenditure, and therefore in all animals it necessarily reaches a limit more or less definite, because with increase of bulk the expenditure of force must relatively increase; the masses of similarly-shaped bodies varying as the cubes of the dimensions, the strength varying as the squares. An animal that has doubled in bulk needs twice the intensity of muscular contraction to move its body through a given space. Thus, however great, at first, the excess of nutrition may have been, there must come a time at which the expenditure overtakes it. Plants, in which there is nothing to call expenditure of force, go on growing till they die; the crocodile and the pike, which from their habits expend very little, do almost the same.

The possible limits of growth depend first on complexity of organisation, as subserving supply and distribution of nourishment; and, secondly, on initial size, as the profits obtainable in a business are proportionate to the capital.

Development, meaning by the term not increase of bulk, but growing complexity of structure, corresponds precisely with the idea of evolution: it is a change from indefinite homogeneity to definite heterogeneity. The embryo of every higher animal, as Von Baer pointed out, passes from the general to the special, by degrees assuming characters less common to all embryos and more peculiar to its own group. It is at the same time, with certain exceptions, progressively differentiated from the medium which surrounds it, alike in structure, form, chemical composition, specific gravity, temperature, and self-mobility. Of types of development there appear to be essentially two: the first round one or many *centres*, the second around one or many *axes*. Cellular plants and animals illustrate the former; trees and all animals above the lowest exhibit the latter.

The functions which life embraces may be arranged in three groups. They subserve either the accumulation of force, the expenditure of force, or the transfer of force: that is, either the incorporation of the food, the supply of the various organs by the blood and possibly by the nerves, or the actions of the various organs. Like the structure, the functions are made more complex and distinct by evolution, and at the same time more strictly inter-independent. In the lowest animals—mere lumps of jelly-like substance—every part serves every office: absorbs, breathes, secretes, acts. Gradually different parts are appropriated to different offices. In the hydra and sea-anemone there are an internal surface to digest, an external to respond to the outer world, and arms to seize

the food. So the differentiation proceeds, while, as they become more complex, all the organs depend for their maintenance on each other. Stomach and brain cannot live without the heart, nor the heart without these. From an indefinite simplicity there has arisen a definite variety. Remnants, however, of the primary convertibility continue to exist within narrow li In disease, especially one organ may often be seer on partially the functions of another.) This is t ine of the Physiological Division of Labour, first ut by M. Milne-Edwards: the body becomes a c and mutually dependent whole, just as society do nction precedes structure. In the simplest anin rhizopods—which are structureless, yet move a l, it evidently does: and deductively it must; for it is by the operation of external forces on the action of a part that structure is determined.

Of waste and repair, the former is immediately deducible from the persistence of force, since no expenditure of force can take place but through the fall of the organic matter from an unstable towards a more stable equilibrium. Repair is not so readily to be understood, yet with a power in the molecules of the body to combine into their own form separate elements around them, it becomes a simple case of integration. The assumption of this power seems to be justified by some phenomena of disease. In small-pox, *e.g.*, the blood appears to be altered by the poison, and the altered particles mould into their own model all those by which they are replaced. Hence the comparative immunity from the disease after the first attack. The restoration of a lost member, or production of the whole body from a part, which occurs in many of the lower organisms, is like the power of a crystal to reconstruct its lost apex when placed in a like solution. The aggregate

forces of the body control the formative process in each part. Here Mr. Spencer proposes an hypothesis, "that the form of each species of organism is determined by a peculiarity in the constitution of its units; that these have a special structure in which they tend to arrange themselves, just as have the units of inorganic matter."

"A fragment of begonia leaf, imbedded in fit soil and kept at an appropriate temperature, will develop a young begonia; and so small is the fragment which is thus capable of originating a complete plant, that something like a hundred plants might be produced from a single leaf. Various succulent plants have like powers of multiplication. . . . As many as fifty polypes may result from the section of one. . . . What now is the implication? We cannot say that in each portion of the begonia leaf, and in every fragment of the hydra's body, there exists a ready-formed model of the entire organism. . . . We have, therefore, no alternative but to say that the living particles composing one of these fragments have an innate tendency to arrange themselves into the shape of the organism to which they belong. We must infer that a plant or animal of any species is made up of special units, in all of which there dwells the intrinsic aptitude to aggregate into the form of that species, just as in the atoms of a salt there dwells the intrinsic aptitude to crystallise in a particular way. It seems difficult to conceive that this can be so, but we see that it *is* so. Groups of units taken from an organism (providing they are of a certain bulk, and not much differentiated into special structures) *have* this power of rearranging themselves; and we are thus compelled to recognise the tendency to assume the specific form as inherent in all parts of the organism. . . . For this property there is no fit term. If we accept the word polarity, as the name for the force by which inorganic units are aggregated into a form peculiar to them, we may apply this word to the analogous force displayed by organic units. But polarity, as ascribed to atoms, is but a name for something of which we are ignorant—a name for an hypothetical property, which as much needs explanation as that which it is used to explain. Nevertheless, in default of another word, we must employ this . . .—organic polarity, or polarity of the organic units—to signify the proximate cause of the ability which organisms display of reproducing lost parts."—P. 180.

For the particles thus endowed, Mr. Spencer proposes the name "physiological units." They are not the chemical units, albumen, fibrin, &c., because from these all forms alike are built, nor can they be the morphological units or cells, for these are not universal, and their existence implies the operation of the formative power. The "physiological unit[s] therefore something between these. The chem[ical] units he infers must combine into units immensely mo[re] complex than themselves, complex as they are, these u[nits] existing in each organism.

Adaptation consists i[n] changes produced in the organs of animals or by the circumstances to which they are exposed, [and] the actions thereby called forth. The increase of a [frequently] exercised limb, the thickening of an exposed surface, the acuteness of a cultivated sense, the false joint which may form after a fracture, are instances. But such adaptations have an early limit. They reach a certain point, but cannot be carried beyond, and without a continuance of their causes soon disappear. This is referable to the secondary changes which an altered, especially an increased, function of any organ involves. From increased action arises increased circulation, increase therefore of arterial and nervous supply. But these secondary changes imply others still in successive ratios, and these can only ensue slowly, and to a small extent. This point is illustrated in Mr. Spencer's favourite way.

"From the laws of adaptive modification in societies we may hope to get a clue to the laws of adaptive modification in organisms. Let us suppose that a society has arrived at a state of equilibrium like that of a mature animal—a state not like our own, in which growth and structural development are rapidly going on, but a state of settled balance among the functional powers of the various classes and industrial bodies, and a consequent fixity in the relative sizes of such classes and bodies. In

a society thus balanced, there occurs something which throws an unusual demand on some one industry—say an unusual demand for ships (which we will assume to be built of iron)—in consequence of a competing mercantile nation having been prostrated by famine or pestilence. The immediate result is the employment of more workmen and the purchase of more iron by the shipbuilders; and when, presently, the demand continuing, the builders find their premises and machinery insufficient, they enlarge them. . . . Let us go a step further. Suppose that this iron shipbuilding industry, having enlarged as much as the available capital and labour permit, is still unequal to the demand, what limits its immediate further growth? The lack of iron. The iron-producing industry yields only as much iron as is habitually required for all the purposes to which iron is applied, shipbuilding being only one. If, then, extra iron is required for ships, the first effect is to withdraw part of the iron habitually consumed for other purposes, and to raise the price. Presently the iron-makers feel this change, and their stocks dwindle. [The iron trade, however, expands under this demand much less rapidly than the ship trade, because only a part of the demand for iron depends on shipbuilding, and meanwhile the growth of the shipbuilding industry must be limited by the deficiency of iron. A remoter restraint of the same nature meets us if we go a step further, in the requisite expansion of the coal-producing industry; and this restraint can be overcome only in a still longer time, because the additional demand on the coal-owners and coal-miners will be comparatively small, and will not for a long time overcome the inertia encountered in drawing capital and labour from other spheres.] Thus in a community which has reached a state of moving equilibrium, though any one industry directly affected by an additional demand may rapidly undergo a small extra growth; yet a growth beyond this, requiring, as it does, the building up of subservient industries less directly and strongly affected, as well as the partial *un*building of other industries, can take place only with comparative slowness; and a still further growth, requiring structural modifications of industries still more distantly affected, must take place still more slowly."—P. 194.

Thus also in the animal organism adaptive modifications will be both slow and limited, and will readily revert to the original type. The fixity of species, therefore, as it

exists in nature, does not contradict the evolution of life.

Genesis, heredity, and variation, Mr. Spencer groups together. The union of slightly unlike units renders equilibrium more easily disturbed, as is seen in the lower melting point of amalgams [illegible] their constituent metals. Thus when the organic fo[illegible]pproaching equilibrium mobility is restored. The [illegible] of offspring to parents results from the similari[illegible] "physiological units." Acquired properties are t[illegible]uated. Dr. B. Séquard having produced epileps[illegible]ain guinea-pigs, found that their descendants w[illegible]tic; Mr. Lewes records that the pup of a mothe[illegible]ad been taught to beg spontaneously adopted the [illegible].

Variation has for its causes the unlikeness of parents, changes wrought in them by functional adaptations, and the varying quantity or quality of the units, which in no two cases can be alike. Variations are greatest where the species differ most, and fundamentally they owe their origin to changes of function which are necessarily adaptations. The doctrine of "physiological units" accounts for all classes of phenomena under these heads.

In the classification of the organic world, no linear arrangement will stand. The groups touch one another on all sides. The most extensive groups are distinguished from each other by profound physiological differences. There is first no distinction of functions; then the accumulation of force is differentiated from its expenditure; next a provision is made for its transfer, and action is distributed between the two factors, muscle and nerve. The smaller groups are distinguished by modifications in these parts, or by the presence or absence of subsidiary ones.

In the local distribution of organisms there exists a

perpetual tendency to intrude on each other's spheres and habits, and the expansion of each is limited only by suitability of circumstance or by local obstacles. Resemblance of types is found even in distant and unlike places if there be no obstacle to migration, and the most closely related localities present different types if migration is difficult. There is no exact adaptation of organisms to localities, as is proved by the frequent extermination of indigenous plants or animals by new arrivals. Of the distribution in time our knowledge is very fragmentary; but we see that change has been continuous and gradual where we have continuous evidence: where there are gaps in the record there are sudden changes in the forms. There is no proof of universal *progress:* where higher animals in succession make their appearance in the strata, it is probably owing to migration from previously existing continents to the present. With few exceptions, each species lives its life and ceases; and types that have once disappeared do not appear again.

Recurring now to the proofs of the evolution of life, Mr. Spencer urges that the distribution of organisms cannot be said to imply that they have been designed for and placed in particular habitats, because they are by no means always found where they are most suited; nor is there evidence of any design to multiply types, because similar types are found wherever migration is facile. On the other hand, changes corresponding to change of habitat or circumstance are everywhere visible, and the changes are more extensive in proportion to the variety of circumstance to which any group is exposed. Even the change from water to air has its intermediate links in molluscs and crustacea, which live only partially in water, in fish which migrate or bury themselves during drought, and in the amphibia. In respect to the distribu-

tion in time, we cannot but ask, if animals were specially created, why was there no *valuable* life so long? or, if circumstances were not fitting—of which there is no proof—why were they not? And why—if creative wisdom be shown in multiform adaptation of one type to many ends—did types, instead of being modified, become extinct? Strongly sugge of evolution, on the othe hand, are the kinship bet recent existing forms and the special relationship xists between the present and the former inhabita each region. The classification of organisms, ag affords confirmation of the evolution of life. It co nds precisely with that of languages, which are ac ledged to have arisen by evolution. Both present t ame fundamental character of subordination of groups, the largest being radically unlike; the groups are of indefinite value, they are united by their lowest members, and they present unity and multiformity.

Further evidence is derived from embryology, in the gradual divergence of the groups as they proceed in their development, and the circuitous course through which many of them pass. The numerous modifications, undergone in some cases before the final form is assumed, point to ancestral modifications produced by external conditions. Again, the suppression of organs once formed and their substitution by others—the teeth in fœtal whales and in some embryonic birds—point to the same source: modifications gone through by their progenitors. Indirect and direct development are illustrated by the social organism. Society at first arises by a long series of changes, individuals gradually specialising or altering their operations as demand increases or arises; but when society is fully developed, offshoots from it are complete in all their elements at once. The units, being influenced

by the whole, at once reproduce its form. So even among mammalia there is seen the commencement of a direct development; for example, in the heart, which arises by direct transformation of the germ-cells. This is an organ which must have been early developed, and has undergone throughout little change in its conditions; so that the action of the whole upon the particles, in respect to it, has been fully exerted. Direct thus tends to take the place of indirect development: the traces of ancestral modifications to be obliterated.

And yet again morphology—the ultimate forms of living things—may be summoned in evidence. These forms present characters which cannot otherwise be explained but by evolution. All vertebrata, from the whale to the giraffe, have seven vertebræ in the neck—except a few. If so many, why not all? Insects and crustacea have all of them twenty segments in their body, though applied to the most various purposes, from feet to jaws; spiders and mites, though closely akin, have not. Are not the twenty segments derived from some common ancestor? See again the unity of plan, or homology, in organs differently used. Snakes need a spinal column, which is movable in all its parts; mammals, on the other hand, require portions of them to be rigid—the sacrum, for example, which supports the lower limbs. Yet in them the sacrum is still composed of several portions. In its development it is first one, then is divided into several, then grows into one again. There are many useless rudimentary organs: snakes have abortive hind feet; the seal has nails on its toes; the manatoe has rudiments of them hidden beneath the skin.

How then has evolution been brought about? Neither an inherent tendency to progress (the elder Darwin), nor efforts made to satisfy new desires (Lamarck), has any

valid basis. Adaptive modifications of function are the true cause; but this formula requires to be reduced again to the ultimate laws of evolution. The factors in vital evolution are external and internal. Among the external come first the larger astronomical rhythms. In 21,000 years the earth presents a larger part first of one and then of the other hemisphere to t the time of its nearest approach to him, giving r ons sometimes temperate, sometimes of extrem d cold. This cycle is included in another of son of years, during which the orbit of the planet be e and less eccentric, increasing and diminishing described effects. The direct influence thus exe fauna and flora, great as it is, is less than that m the alternate extensions and limitations of their habitats, occasioned by the changing temperature, which carry each species into the presence of new physical conditions. Next there are the perpetually recurring geological changes which give an increasing complexity to the earth's surface in most various ways; and with these the accompanying revolutions in atmosphere and climate. There are also the influences exerted by organisms on each other, especially by intrusions on each other's habitats; the conditions becoming more varied with every new accession of locomotive or other faculty in the subjects of them. Among the internal factors of evolution are the increasing heterogeneity involved in the very nature of force, which applies alike to the individual and the species: the additional changes brought about by every previous change—the modified development, for example, of neck, forelimbs, and therefore of every part, involved in increased weight of head. An increasing definiteness of structure also is implied; and this in spite of varying conditions, because the variations must be trivial in comparison with the con-

stant elements, or life would be overthrown. Some organisms, however, may escape the effect of these multiplied causes of change, neutralising them by migration. Hence the perpetuity of a few species from the earliest times to the present. Finally, these accumulating changes must be such as to subserve the life of the individual, because they necessarily constitute a process of equilibration, or balancing of external by internal forces. This equilibration is direct or indirect. Direct is adaptation —modified function answering to external conditions; indirect equilibration is brought about by natural selection, or, as Mr. Spencer terms it, "survival of the fittest." By this means are rendered permanent those structural conditions which subserve the life of the individual, but which cannot have their source in adaptation; such as protective thorns on plants, a firm shell around an egg, the long leg of a wading bird. If, from severity of season, or from stronger enemies, the weaker portion of a species are destroyed, the next generation being derived only from the stronger remnant of the race, is itself of a stronger order. Thus the external and internal force is balanced, and *vice versâ*. But as the faculties of a species multiply, and the want of one can be compensated by the possession of others, natural selection becomes of less influence. It is of least influence among civilised mankind, with whom indeed, in advancing evolution, changes in the brain or mental organisation tend to take the place of modification of external structure.

Thus, even apart from the physiology of individual organisms, many evidences converge to demonstrate evolution of life by natural forces against the doctrine of special creations. Various *à priori* considerations may be added. The latter view is probably false, as being an early belief arising in ignorance, as being one of a

class of similar views which have been found to be erroneous, as being countenanced by no known facts, and incapable of being formed into a coherent thought. If we suppose a being capable of witnessing only a small part of the life of man, he would have as good a reason for supposing each individual specially created. There are also theologic ulties arising from the evils incident to organic hich reach their climax in the existence of ent For, if special creation be true, these must h n created specially to torment the higher live. it even the poor excuse in many cases of a capa pleasure in themselves: created and endowed w ial powers of existence and multiplication to cu the chances of escape. The doctrine of evolution is contrasted in all these respects. It comes with knowledge and arises among those who are best informed; it is one of an increasing class of opinions; it can be conceived, and so forms a legitimate hypothesis; we see like things, *e.g.*, straight lines, passing through every stage into circles, which are utterly opposed to them in properties; we see, too, that formless germs do evolve into the highest organisms; there is some direct evidence, in the shape of known modifications of structure, and though it is not much, it is proportionately equal in amount to that on which the evolution of the structure of the earth is inferred from present geologic change. Evolution is morally more satisfactory, for though it does not tell us why evils could not have been avoided, it puts aside the question, why were they deliberately inflicted? These evils no longer suggest deliberate malice; nay, slowly but surely evolution brings about an increasing amount of happiness; all evils being but incidental and diminishing.

Scanty as is the summary thus given, and little as it

represents the wealth of Mr. Spencer's volume, by far too many points present themselves for remark for us to attempt to touch upon more than a few. But we have thought it well to present with a certain completeness the outline of the argument, both because we felt that in no other way could anything like justice be done to it, and because we think many readers will thank us for laying before them the leading points of what is certainly a very powerful and valuable, as well as novel train of reasoning. Never before, that we are aware of, has the attempt been made with any degree of scientific precision, to subject the phenomena of life to a deductive process. Yet if we are ever to gain a real and commanding knowledge of physiology, this attempt must sooner or latter be made—and succeed. And whatever may be Mr. Spencer's success in detail, there can be no doubt that the path he treads, and to which he has at least given an unprecedented scope and completeness, is one that promises great results, while many of his own conclusions bear the stamp of truth. In respect to the main position he aims to establish, that organisms have been "evolved," and not specially created, it is enough to say here, that we entirely agree with him. The hypothesis of special creations has, to our mind, nothing in its favour except human ignorance and the good intentions of its authors. Yet we confess that we were somewhat struck with the novel view in ethics presented by the doctrine that there is so great a moral difference between instituting a chain which involves certain results and directly bringing them about. Suppose the idea applied to social life: a man does not directly fire the gun which destroys an innocent life; he only so arranges, or consents that so should be arranged, the gunpowder and the fire, that in the course of inevitable

"differentiations" it will be destroyed. Mr. Spenc however, is reserving ethics for another volume, a perhaps we do wrong, though we do but follow l example, prematurely to start questions of morali Our parallel also implies that the inscrutable first cau even on the theory of evolution, is still a being with wh power dwells and who ...ts its responsibilities. I on any view it is surel... undesirable thing (and M Spencer, who places all ...ion in the sense of myste would not dissent from ...) to endeavour *illegitimat* to lessen the feeling o... tery with which the phen mena of nature, mor... well as material, affect t student. That ento... hould devour men, shou subject to loathsome ... orturing disease or madn the sensitive nerves and brain of the world's ch denizen, is a dark mystery. Face it fairly, see it thing as much meant and designed, as much embodi in the whole scope and make of life, as cool wat or the breath of flowers, or the answering glance eyes, and it becomes dark enough to be full of infini suggestions. It has a meaning fearfully attractive- perhaps yet destined to be read; perhaps capable bearing its part in raising our whole thought to a ne level of moral elevation. Who knows what a fe mystery may not do for us in the sphere of mora as in that of knowledge? or how should it be le fatal to banish it unsolved in the one case than i the other? Evolution or no evolution, the moral pr blems of this great phenomenon, the world, form a boo the reading of which has yet to be re-attempted by mar kind. Let us spare ourselves the task of whitewashin its solemn characters.

Perhaps in the ardour of his controversial zeal, M Spencer is betrayed into speaking a little too contemptuousl

of the views men frame in ignorance. To us it has long appeared that the beauty of organic connection and correlated evolution is nowhere more strikingly visible than in the development of thought from its earlier to its later forms, and that scarcely less beauty and adaptation are traceable in the first than in the last. Often it might surprise us, if a law were not recognisable in it, to see how an early thought anticipates the latest, or lays hold of the essential conditions of a problem which subsequent ideas, framed with a greater amount of knowledge but less insight, fail to maintain. We may remind Mr. Spencer how early, on this very subject of evolution, his own doctrine was affirmed, and amid how much of ignorance it was nursed. So far from having arisen only in recent and scientific times, and driven out the opposite as light advanced, the process seems rather to have been the other way. In a dark and mistaken form, doubtless, the evolution of living organisms by natural force is as old as the most ardent lover of antiquity could desire. Nay, what could be more naturally suggested to an ignorant eye by the teeming life of the warmer countries of the world? It was growing knowledge, accurate observation, that banished the conception, which now, in more reputable associations, again solicits our suffrages. This is a point worth remembering, especially perhaps with reference to the probable future of opinion, or even—which is more important—the correct estimate of our own. Did not *observation* of the heavens banish utterly and put to rout the heliocentric doctrine of Pythagoras?—restored too, not by observation, but by private meditation in a cell. Those primitive ideas of life based upon the primordial impressions which it makes on us, and which led men to endow it with even superstitious self-directive and sustaining powers, are not without their justification, and will

perhaps, hereafter, be invested with fresh meaning. We are the more confirmed in this opinion by noting, as we have done, not without some surprise, that not even so trained and guarded a mind as Mr. Spencer's is fully emancipated from their power. Surely in the doctrine of "Physiological Units," er[illegible]ith "inherent tendencies" to assume the form of e[illegible]icular organism, we cannot be mistaken in rec[illegible]the identical lineaments, however shorn of their [illegible]ortions, of our old friends the Archæus, vital prin[illegible]*s formativus*, and so on. Though yielding thus [illegible]cination too strong, and doubtless too firmly ba[illegible]me deep necessity, to be entirely overcome, Mr. [illegible]as himself, in treating of another subject, most emp[illegible]ly pronounced their condemnation. "In whatever way it is formulated, or by whatever language it is obscured, this ascription of organic evolution to some aptitude naturally possessed by organisms or miraculously imposed on them is unphilosophical. It is one of those explanations which explain nothing, a shaping of ignorance into the semblance of knowledge." In what way does "the tendency to assume the specific form inherent in all parts of the organism," affirmed by Mr. Spencer, differ from the "aptitude for organic evolution naturally possessed by organisms," thus condemned by him? Unless it be in this, that the organism or the germ, to which the aptitude to evolve is ascribed, is a known phenomenon, while the physiological units are postulated for the occasion. The analogy of the crystal, to which reference is made, is not available, for two reasons: first, that it is equally unscientific to infer an inherent tendency to assume certain forms in the one case as in the other; and, secondly, because the circumstances are radically different. The atoms of the crystal are simply deposited in a certain form, which, having once

assumed, they passively retain, so that we might almost conceive that certain peculiarities of shape alone might account for the phenomena; but the living body in its development presents a long succession of *differing* forms; a continued series of changes for the whole length of which, according to Mr. Spencer's hypothesis, the physiological units must have an "inherent tendency." Could we more truly say of anything, "it is unrepresentable in thought"? When Mr. Spencer says (p. 181), "It seems difficult to conceive that a plant or animal of any species is made up of special units, in all of which there dwells the intrinsic aptitude to aggregate into the form of that species; but we see that it *is* so;" it is difficult to think where his extraordinary philosophical acumen could for the moment have been laid aside. Surely we see nothing but that it *appears* as if it were so. The truth is, simply, that in nature there is no "inherent tendency" whatever, nor can be. The idea is essentially one and the same, wherever it appears, or under whatever guise; and is the one enemy with which science contends. It is simply the denial of causation. All tendencies whatsoever are manifestations of effects, are the results of operant forces, either present or past. The "inherent tendency" of a cannon ball under certain circumstances to shatter whatever opposes it is a type of all.

We have the more freely expressed our dissent on this point, because on the one hand it is a position quite in antagonism to the rest of Mr. Spencer's book, and seems to us by its indirect influence materially to detract from its perfection, as leading to the omission of certain physical elements involved in vital phenomena, which, if he had not held this phantasm before his eyes, he would necessarily have more fully recognised. And on the other hand, the inconsistency itself, when traced to its roots, is

amply justified and most significant. It is not given to Mr. Spencer, who has shown so many evidences of a truly religious nature—not yet, perhaps (if we may use his own formula), perfectly equilibrated with his scientific apprehensions—to discuss the phenomena of life on the basis of matter and force alone without reference, express or latent, voluntary or inv to that which is beyond. By his own statement, truly reducible to these abstract and empty ter y seems to be so. These are not the actual verit eptions unrealisable even in thought, and far en fulfilling the true conditions of the source of li el reverently towards the "intrinsic tendencies ogical units," recognising in them a peering forth ctual from beneath the phenomenal; obscuring its outlines indeed, yet witnessing to that for which alone it is of worth, by which alone it is. But we are treading here on forbidden ground, and must forbear. We cannot, however, but note the essential dependence of the scientific on the philosophical portion of Mr. Spencer's book. It is on condition that the terms in which he works are first expressly abandoned as known, and affirmed only as unknown quantities, that he can work with them. Life may be represented in terms of matter and force—because they are merely terms. It is expressible so, not thence derived. The mechanical elements in which the problem is resolved are *products*, not genuine *educts*, of the analysis. They are resultants of our mental processes, and rejected even by the faculties to which they owe their origin—a progeny devoured by its parent.

Probably it would have been well if this position, clearly enunciated at the outset of the work, had been more distinctly kept in the reader's view (as doubtless it has been in the author's) during its course. The language

necessarily employed is so apt to seem to affirm more than it truly does affirm, that an occasional recurrence to principles might be more than pardoned. It need never be forgotten that, however vital phenomena may be formulated in these x's and z's of molecules and forces, what life is still remains open to all the emotions of the soul; it is uncrystallised and fluent as ever to the heart; and this above all is certain, that the greater can never be derived from the less. If personal elements of consciousness and will have been falsely introduced, their expurgation can leave no vacuum. There is an atmosphere which forbids a void—that from which conscience and reason are derived can never be expunged.

For this digression we make no apology. The twofold aspect of physiology cannot be ignored. Nor could more be done to facilitate and advance its scientific study than by pushing wholly aside the obstacles which result from the substitution of mechanical for vital terms. There are necessarily many minds to whom nothing but a clear apprehension of this point can make the physical treatment of physiology tolerable, far less induce their active co-operation; whereas, in truth, its interest and significance from the emotional and poetic side are infinitely increased by this rigid formulation. That life, be it truly what it may, is susceptible of this ordination under the forms of the intellect; that besides what it presents to our perceptive and moral sensibility, it possesses also this boundless and almost incredible simplicity, is capable of being summed up in a few self-evident or rigidly deducible axioms, multiplies its wonder a hundredfold. Embodied in it, with all its variety of beauty and of use, are an absolute simplicity, an absolute necessity. It is, as it were, the bare and rigid pole that is clothed thus with flowers. There is no beauty of adaptation here, no grandeur of

harmony, that is not necessary, rooted deep as the foundations of the earth, implied when we have said "existence." Nor any defect or failure, no loss or seeming ruin, no sacrifice of myriad lives or slow wasting of a solitary frame, that does not root itself equally upon the centre and lay its hand upon the universal heart.

Before we turn to Mr. r's definition of life, on which we have a few ren o offer, we may present, in a summary form, a v the phenomena of the organic world, which see is to exhibit, in a clear light, some of its most in characters. We do not say it is better than othe- ntations, especially than that, given by Mr. Spen a "Moving Equilibrium between Internal and Exte orces." Probably for its due exhibition life needs to be represented in many ways.

Evidently involved in the doctrine that force neither increases nor diminishes, is this consequence, that every change which takes place in nature must have two aspects: it must be, on the one hand, a new exhibition of force, and, on the other, it must involve the withdrawal of force from a previous mode of operation. The importance of observing this twofold bearing of all natural changes lies in this—that the withdrawal of force from a previous mode of operation is also practically an action, and involves a change. Every action in nature, therefore, is truly two opposite and equal changes, and, to be adequately apprehended, requires to be seen in both its aspects. If one of the two constituents alone be recognised it is half unseen.

But since we necessarily regard natural changes in their particular bearings, and with reference to special results, rather than from a point of philosophical abstraction, this result of the persistence of force presents itself to us under another form. Natural changes constitute

two groups oppositely related in respect to force. Some of these changes exhibit the new operation of force, as when a weight is raised; others show the ceasing of the operation of some force, as when a weight begins to fall. It is true that in every case such action has somewhere its equal opposite; but this is often unseen by us, or is practically of no moment. The two classes of changes present themselves to us as opposites, and as such they need to be distinguished, and deserve to be marked by distinct names. We do indeed so distinguish them in special cases: we speak of "rise" and "fall," apart from mere direction, to represent the opposite dynamic relations of two processes. But we do not seem as yet to have thoroughly generalised the distinction. For these two kinds of change accordingly we propose here to use the terms "force-absorbing" and "force-liberating." The elevation of a heavy body absorbs force; the fall of it liberates force. All natural changes are of one kind or the other.

But again: there is an evident link between these two classes of changes—a logical order of succession. The force-liberating must precede the force-absorbing; the fall must produce the rise. This is practically so familiar that it needs no proof. In a balance, it is the fall of one scale which causes the opposite to rise; the sinking of the fluid in one leg of a syphon elevates it in the other. In every force-liberating change we have given to us the necessity for an equal change of the opposite character; for every force-absorbing change we must seek the cause in some equivalent force-liberating change. The simplest corollary of the persistence of force is, that every fall produces some rise; every rise depends upon some fall. This law of course is universal; it applies to all forces, to all forms of change; and whenever, there-

fore, there are found in mutual relation two changes, or tendencies, thus opposed—one force-absorbing, the other force-liberating—there is *primâ facie* evidence that they stand to each other as effect and cause.

It is further evident that force-liberating changes imply the presence of some force [illegible] up or rendered latent in the form of tension. Gra[illegible] the great, or at least the most obvious, form of ten[illegible] the universe; but there can hardly be any force t[illegible]y not exist in that form, since force necessarily be[illegible]nsion in so far as it is balanced by resistance. [illegible]ic matter the tension is based upon chemical affi[illegible]t presents two sets of changes, or tendencies, m[illegible] related: one force-liberating—the ordinary chemi[illegible]ction or decomposition; the other force-absorbing—the vital action, or nutrition. These are true opposites in respect to force; they are bound up together in the living body, and they are bound up as cause and effect. That in life chemical force should be the cause of an opposition to chemical force is as simple as that the gravity of one weight should support another; the requisite adjustments being in each case supposed. Not that chemical force is to be assumed as the only source of the resistance in organic matter to chemical affinity; other forces doubtless share in the action: in plants light works visibly to this end. But to recognise chemical action as also working thus, seems to give an insight into many of the processes which characterise organic life, in the animal world especially, and may possibly aid us in judging how it should be defined.

For the fact which, almost more than any other, strikes the mind when vital phenomena are traced but a short distance below the surface, is this: that the total activity of the body, its total existence almost, consists in the perpetual interweaving of these two opposite processes—

nutrition and decay, the raising up, the fall, succeeding each other, or going on coincidently in every part. Recognising the mutual dependence of these opposites, and that the chain which unites them is knit doubly close, we see that, though ultimately dependent on the external world, the body has within itself, to a limited extent, the source of its own life. Besides its power of external action, wrought through the fall of the raised molecules, it has in that same fall also a spring of renovated vitality; the chemical, the anti-vital, processes continually going on within it, do thus support and maintain its life. Wheresoever is decay, the force of which is not expended as external function, or as heat, there is a focus at which the torch of life may be fresh kindled—a new turn of tension given to the relaxing textures. That the various activities of life have this connection, is palpable. Take respiration, for example. The force-liberating process involved in the union of oxygen with the elements of blood (whether in the lungs or capillaries),[1] institutes and supports a force-absorbing process. It not only purifies (this is but a half view), it vitalises the blood. Very significant in this respect is the fact that heat cannot be distinctly shown to be generated in the lungs.

A similar office may unquestionably be discerned in some, at least, of the secreting glands. A decomposition of the blood in more ways than one takes place in the liver, producing bile and other substances. Here is a force-liberating change. Is not the correlative force-absorbing change to be recognised in a higher vital tension of the fluid which has furnished them? The fact at any rate is to be accounted for, that from the less

[1] The recent experiments of Professor Stokes on cruorine, and its varying relations to oxygen, render it most probable that the blood undergoes a true oxidation in the lungs.—See Trans. of Royal Society, June 1864, p. 355.

highly-vital food, as the liver and the lungs successively fulfil their offices upon it, the more vital, that is, the more force-containing, blood is formed. To these may be added the fact, discovered by Bernard, that during active secretion (of saliva, for example), the blood that has traversed the gland passes out of a l scarlet hue, while in the intervals of inactivity it ts the ordinary venous tint. Another familiar e is the vitalisation of the vegetable germ throu oxidation of the starch laid up in the seed. I ie process of nutrition itself presents characters suggest the same interpretation. Amid the va issues flows the blood, bearing elements for all. ll do not stand in a like relation to it. Some have (probably, for we are here on somewhat conjectural ground) a higher vital status, an intenser concentration of force. Among these we may place brain and muscle. Others are lower than itself—bone, tendon, cartilage. Does not the blood, by sinking into the one, partly gain the power whereby it rises into the other class?

Is not the contemporaneous development of the various systems component of the body, each of which without the other were of no avail, in part determined thus? The frequent *wasting* of the internal portion of an embryonic tissue, while the circumference develops, might lend the idea countenance. It is true the use and renewal of brain and muscle vastly exceed that of the merely passive lower tissues; but the latter do waste, and are repaired. Their formation and maintenance claim place as one factor, though but a subordinate one, in the vitalisation of the blood. And, finally, though our instances are but begun, may not the apparent renovating effect of some severe diseases find its explanation here? The excessive waste and fall of matter in the fierce pangs

of fever, if, happily, they leave all vital parts undamaged, may they not transmit a remnant of the force thus violently freed to that portion of the blood and tissues which have preserved their balance? May not a fever sometimes be an act of respiration on a larger scale?

Let us now take up the definition of life proposed by Mr. Spencer. It is scarcely necessary to remark that he disclaims the pretence of giving anything more than an approximate definition; and we agree with him in the value he attaches to the attempt. Nothing can better serve to test our knowledge, and to give precision and completeness to our ideas. Previous formulas need not detain us now. Mr. Spencer's is, as we have seen, "the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences and sequences." In framing this definition, Mr. Spencer proceeds upon the plan (which he counsels for general adoption) of taking two extreme instances, and finding the characters possessed in common. He chooses the lowest form of physical life as one element, and *reasoning*, as an example of the highest mental life, as the other, and frames a definition on that which they possess in common. It is, at least, interesting and valuable to see the result; but for our own part, we should prefer for physical life to take the narrower basis of physical phenomena alone; nor does it appear to us that in this relation Mr. Spencer's definition, ingeniously and scrupulously as it is constructed, will bear a rigid scrutiny.

It is obvious to remark, first, that it only includes dynamic and not statical phenomena. Not only does it exclude from the domain of life a seed, but even a tree in winter. These, we presume, are held as not possessing life, but only a capacity for life. Yet surely this is not

satisfactory. It appears to us, rather, that not only seeds and dormant trees ought to be fully included in the definition, but also organic matter in its most indefinite form—a portion of white of egg, for example. The distinctive character of this substance is that it is living. Secondly, the definition affirms of living things that which is not universally en of those which it is meant to include. By rrespondence between internal and external re Mr. Spencer expressly states, that he means no succession of internal changes directly answer xternal, but that one change produced by exte itions in the organism institutes another chang it, which is in correspondence with another cha ut to ensue externally. He says (p. 78): "Let some change, A, impress on an organism a change, C; then while in the environment A is occasioning *a*, in the organism C will be occasioning *c*; of which *a* and *c* will show a certain concord in time, place, and intensity." We cannot see that such consecutive correspondences are present in all living bodies—hardly, even in the majority. The amœba surely responds simply to direct external impressions, in so far as it responds to them at all. What secondary process, answering to a future change about to occur around it, is set up in it by stimuli? or even in the hydra?

Mr. Spencer does not furnish illustrations here, and we confess we cannot supply them. To us it seems that this description answers rather to the presence of a nervous system than to life. One of the chief functions of the nervous system is to institute such secondary adaptations, to enable one part to be modified by modifications of another. Thus such correspondent series of external and internal changes come to be characteristic of the higher grades of

life, but they do not penetrate to the lowest strata. Mr. Spencer's own words imply as much. He says, "*If we take a living body of the requisite organisation*" we shall find this nexus; but this gives up the definition. On the other hand, if this complexity of correspondence be given up, the definition ceases to be distinctive; for the motions of the earth furnish surely as complete a fulfilment of it as could be desired. These motions are definite, they are combined, they are in certain respects heterogeneous, they are both simultaneous and successive, and they take place in the strictest correspondence with external coexistences and sequences.

But further, even if it were granted that this succession of internal changes in correspondence to external, to which Mr. Spencer refers, were universally present in living organisms, the definition would still not be satisfactory; for if we could not discover anything else in nature answering to it, we could construct something. Let us suppose a water-mill, with a float placed upon the stream above, and so attached as to raise or lower a sluice as the amount of water varied. Would not Mr. Spencer's definition of life be perfectly fulfilled in this? Using electric wires for nerves, surely innumerable such pseudo-living creatures could be manufactured. Nay, look at the chronometer. Does not here an internal change—expansion—produced by an external cause, lead to a second internal change, an adjustment of tension in strict correspondence with the external sequence?

Other objections of a different order might perhaps be urged: such as that the definition refers only to the external phenomena of life, and takes no note of its *becoming*, the process by which it is; that though recognising the *correspondence* of the internal with the external, it ignores its identity and absolute dependence; that in

it the individualisation involved in life, which, as truly affirmed by Schelling and Coleridge, is its chief characteristic, sinks into the background; and finally, that it is not expansive, that it does not suggest, but gives rather a feeling of finality. These, however, are matters on which it is not worth while to [illegible] The point of interest that arises from the disc[illegible]s in our view this: that what may be called a *qu*[illegible] definition of life is not to be obtained, because t[illegible]ences on which it could be founded do not exis[illegible]erely we believe that if life could in its distinct[illegible]cters be defined by man, Mr. Spencer would have [illegible] As every definition in the past has broken do[illegible] we believe, must every definition in the future, w[illegible]seeks to draw any other than a merely relative distinction between the organic and the inorganic. The difference is but relative; it is one of form and mode alone, and no definition can stand which does not recognise this fact.

It is hardly fair, perhaps, to criticise another man's definition without presenting an opportunity for return. We will venture, therefore, undeterred by the *disjecta membra* which lie around, though with no vague forebodings of the fate before us, to try another; keeping, however, within the humbler field of material or organic life. Our definition would be this: Organic life is the limiting, within certain forms determined by external conditions, of molecular changes, both force-absorbing and force-liberating; with the effects of such limitation. Or more briefly: Life is a local limiting of molecular change.

If there is nothing more in organic life than in the rest of nature—and we have seen that if there be anything it is impossible to discover it—may there not be, in spite of appearances, something less? may not the

organic be derived from the inorganic, not by a *plus* but by a *minus?*

We intend here simply to suggest whether the idea of a limit might not be found useful in physiology, and cannot pursue the subject into detail; yet having exhibited our wares, we may perhaps, like other showmen, be permitted modestly to praise them. This mode of regarding life answers precisely to that series of united force-liberating and force-absorbing changes, repeated within the same compass, which we have seen that organic bodies present. *Through* all inorganic bodies force passes; it enters them, affecting them more or less intimately, continuing in them for a longer or a shorter time, and then leaves them, being transmitted onwards to another recipient; but within organic bodies it *circulates.* Part of it is passed on in external function, but part of it is retained. The forces of the living body, besides being transmitted externally, are bent inwards on itself. They are limited in their circuit; and thereby establish those permanent yet ever-shifting centres of force which we call living. Nor could such centres be otherwise established save by a limit to the circulating force, unless we imagined it endowed with the power to direct itself. An illustration will aid our conception here. Life was likened by Cuvier to a whirlpool, as being a constant form with ever-varying substance; but the idea will bear a deeper probing. Let us think not of a whirlpool simply, but of an *eddy* in a stream. All around it runs a large continuous current, from which it is marked off—individualised, we might almost say—by a certain difference of form and mode. Yet it consists of the very same elements, material and dynamic, as the stream around, upon which it is entirely dependent. That stream represents the great stream of force; that eddy the living organism. The eddy exhibits to us the

current locally limited and turned upon itself. Save by such limit (be it from inequality of ground or whatever other cause) it could not be so turned; but a limit inevitably by the persistence of force must turn it so. The motion of the stream, being limited in its onward course, takes the reverse direction, becomes the opposite to itself, flows to a c extent, measured by its momentum, upwards ag vity. The eddy presents to us opposite motions, d up, united and mutually dependent. The force- ; downward motion pro- duces the force-absorbin , and they dwell together in one definite shape— yet transient; for the force in it, however lon ulation may continue, is given off into the outer ; last, and the temporarily isolated fragment is resolved into the surrounding elements. But not until it may, serving as a new limit, have imparted its existence to another. Surely it is life in all but name.

Does our definition fail, then, by including too much? No. *Dynamically* an eddy answers to the simplest form of life, but not in respect to the nature of the changes involved. Life is a limiting of molecular changes—it might be simpler to say *chemical* changes, but that the term is open to objection—the eddy exhibits a limiting of mechanical ones. By laying stress upon the molecular character of the changes primarily concerned in life, the definition excludes those mechanisms which form in some respects the closest analogues of living organisms, and so greatly embarrasses any definitions which dwell most upon their mechanical phenomena. It places those mechanical phenomena in their right place, as secondary. Some other advantages also the definition proposed seems to possess. It lays hold not of the mere phenomena of life, but of the process which constitutes it; and so to a certain extent gives an account of its becoming. It em-

braces the statical as well as the dynamical phenomena involved; the things in which life is latent as well as those which exhibit vital activity. It puts the individualising tendency in the foreground, and expresses in its terms the essential identity of the organic with, and its intimate dependence upon, the inorganic. It is true the correspondence between the organism and its environment is left out, but this is necessarily involved in its dependence, and is therefore implicitly included among the "effects of the limitation." It is probable, also, that its remarkable correspondence, or adaptation to conditions, is only an apparent distinction of organic structure. Indefinite and more or less incoherent, from our point of view, as are inorganic phenomena, it would be a narrow conception that should refuse to allow them, under other aspects than those directly cognisable by us, at least as perfect a connection and as definite and unitary a subordination, as are visible to us in the more contracted organic sphere. An entozoon—with whatever powers of reason endowed—would probably make little beyond accidental stratifications and aggregates out of the body of a man. Its sphere of definitely combined and correspondent changes would probably be pretty much confined to its own body and those of its compeers. Here again it should not be forgotten that evolution from homogeneous formlessness, though true according to some of the laws of our apprehension, is phenomenal only. According to other elements of our intellectual being, it would seem not less demonstrable that the adaptations which are seen in organic nature, must involve fully equal adaptedness in that from whence it flows. Nor probably are the two views, each maintained with due relations, at all contradictory. The multiform correspondence, with its results of use, characteristic of the organic world, is not introduced

by the limiting on which the organic condition depends, but only the direction of that correspondence to certain limited and particular results. Another advantage, indeed, which the suggested definition of life possesses, is that it brings nothing out of nothing: does not derive the more from the less.[1]

But it is in the expan and the many ulterior bearings of the conceptio mit, as applied to life, that perhaps its chief att s. It seems to cast a light alike on the fund stulates of the theory of evolution, and on the y ramified vital phenomena. For example, M 's first great deductive law from the persistence s, as we have seen, that of the instability of the ieous; or, that change must necessarily commence wherever all parts are perfectly alike. But as he himself allows there is an exception to this statement, "one stable homogeneity only is hypothetically possible. If centres of force, absolutely uniform in their powers, were diffused with absolute uniformity through *unlimited* space, they would remain in equilibrium."[2]

[1] It seems worth considering whether the philosophical method used by Mr. Spencer might not be fruitfully extended. Matter and force, he says, can neither be destroyed nor introduced. When we seem to do either, we do but change the form. Nor does it invalidate this deduction, that to all appearance, and to all practical purposes, we create what was not, or annihilate what was. May not the same class of propositions be applied further; for example, to such things as *order*? Can order come into existence, or cease from existing? Granted that, apparently, and to all practical purposes, it is created or destroyed, there is not in this the least presumption that such creation or destruction truly takes place. Is not the form merely of the order changed; from an apparent to an inapparent one, and *vice versâ*? It is true that order is not an existence, is perhaps only a conception of our minds, a purely relative term. But this would not affect the argument, for force and matter are the same. It may be said that order is a mode or condition only; but the same is true of motion. Can we any more think *being* and *not-being* together in the one case than in the other?

[2] "First Principles," p. 386. Mr. Spencer goes on to say that "this, though a verbally intelligible supposition, is one that cannot be represented

Thus the idea of a limit is one around which evolution centres, in its widest as well as in its narrowest sphere.

And again in the same relation, the idea of a limit is equally suggested by the phenomena of force. Entirely unreconcilable with any complete dynamic theory is the idea of permanently fixed centres of force—any inherent powers. Gravity, for instance, refuses to be correlated with other forces; it remains as a permanent stumbling-block. What we rationally demand is an ever-current force always equal in amount, but never traceable to a final home:—a force which we might trace back and back under shifting forms indefinitely. Nay, this doubtless is the true theory of force; the mind can never be at rest under the incubus of supposed fixed centres, howsoever imagined, beyond or before which force is not. These fixed centres, these apparent primary foci of force, how then do they arise? Clearly by a limit. Limit force in time, and the phenomenon of "centres" of force is given.[1]

But to descend to regions less remote. The influence of this relation to a limit is visible in other phenomena

in thought; since unlimited space is inconceivable. All finite forms of the homogeneous—all forms of which we can know or conceive—must inevitably lapse into heterogeneity." But is it not remarkable that Mr. Spencer should make representability in thought a condition of his postulate, when he has himself taken so much pains to show that matter and force and motion are themselves not representable in thought? He says, for instance, p. 61: "It is impossible to form any idea of force in itself, (and) it is equally impossible to comprehend either its mode of exercise or its law of variation." It would appear surely that the starting-point at which Mr. Spencer legitimately found himself, was not a limited, but an unlimited homogeneity, in which, therefore, no evolution would occur, and that the one condition required to establish the whole process was precisely that of a limit—the very conception which we have found to constitute the starting-point of that new evolution upon the old, the organic world. The coincidence here seems striking.

[1] And since "matter" is resolved into "centres of force," do we not, though somewhat vaguely, seem to trace *matter* to a limit?

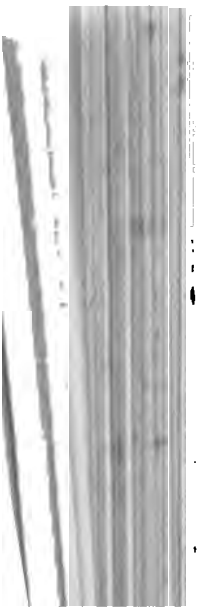
belonging to the organic body, besides those before referred to. Its effect may be traced in the progressive increase in the amount and complexity of life. Upon the evolution theory the organic world has grown up out of the inorganic; that is, more and more force has assumed the vital form, and become expended in producing that unstable union of molecules which constitutes matter organic. e same time, the forms into which this matter is p assume more and more complexity of structu exhibit an increasing intensity of force. A is the general idea to which these phenomen That occurs in respect to the organic world wh s when a fluid is pressed into a space from which no proportionate egress. There arises a continually neightening tension. The force being retained, and, as it were, turned inward on itself, becomes more intense. Possibly we may witness the results of this process in the highly complex structure of the organic molecules and the successive stages in which their decomposition takes place. None but the simplest organic substances are resolved directly into the ultimate chemical compounds. Almost all of them, in their fall from their unstable equilibrium, sink by successive slips, each containing less force than the preceding. In this complex structure and manifold process of decomposition, do we not see evidence of a complex process of upbuilding—successive impulses of force applied to the same molecules?

If we turn from development of force to that of form, the same view recurs. Without reference to the constant tendency to increase of organic matter, and a resistance to its mere expansion, the extremely involved and, as it were, convoluted structure of the higher animals, can hardly be explained. Mere modifications by external

circumstances have no adaptation to make life more, though they may tend to alter its distribution; and simple differentiations and integrations do not account for the immense concentration of structure as well as force, the compressed and implicated variety of parts, which is characteristic of the more developed organisms. The general conception, which, as it seems to us, should be applied to the evolution of life, is one which recognises a *pressure* of the natural forces tending to give rise to the organic state of matter, and a constant resistance under which this process is carried on, leading to a higher tension of the force, and a more involved structure in the forms in which it is exhibited. This view furnishes also a partial justification of the otherwise untenable doctrine of an inherent tendency in life to progress. There is not an inherent tendency; but there is, apart from changing circumstances, an external constraint.

This pressure from without, arising from increase of the vital form of force, Mr. Spencer does not expressly note as bearing on evolution; nor does it appear to us that he assigns it even by implication a due place. Without it, the causes he assigns for evolution appear insufficient to bear the weight which rests on them. Adaptations do not alter totals. It is possible that he may design to make more reference to phenomena of this class in the succeeding volume, to which the discussion of individual structure is deferred; but it seems to us that they should find a place in the treatment of the general doctrine of evolution. Nature becoming organic —that being so far the direction of least resistance for her force—we believe is the great element which lies at the root of the whole process; nature becoming organic under limit.

And this balance of vital action and limit or control,



with Mr. Spencer
of an universal fu
this point and ma
press upon us, we
with regret we lea
and see our task cu
hope to resume it a

XXVI.

ON THE RELATION BETWEEN CHEMICAL DECOMPOSITION AND NUTRITION.

(1862.)

My attention has been drawn to the question which heads this paper by my having become unwillingly involved in a controversy as to the origination of the view that the motor power in nutrition is chemical decomposition. Dr. Waters, of St. Louis, in America, on the one hand, claims to be the first propounder of this thought, and Dr. Freke, of Dublin, on the other, affirms his priority. Between them I am not competent to decide, though I am of opinion that both claims are practically just; Dr. Waters' statement being full and complete, but later; Dr. Freke's being earlier, but more indistinct, and perhaps capable of more than one interpretation.[1]

Dr. Freke says, "We find the living atom has imparted its organic properties to the inorganic matter, and in parting therewith has itself become inorganic." Dr. Waters, and others after him, trace out in express dynamic terms the process as they apprehend it; namely, that in the decay of one portion of organic matter force is set free, which acts as the "organising" force of other matter, either causing it to become organic (having previously not been so), or raising it from a lower to a higher vital

[1] "On the Origin of Species by means of Organic Affinity." By H. Freke, M.D., &c. London: Longmans. 1861. P. 48.

state. It is in respect to the true order of ideas here that I wish to say a few words. Which is the true thought:—Does the first organic matter "impart its force," and thereupon decay? Or does it undergo decay, as representing a "tendency" of the elements, and so come to impart its force?

There is no doubt that, ur accustomed ideas of the properties of matter, tl : is the view into which we most readily fall. Bu flection it by no means appears clear that it is ue one. Granting an "inherent chemical affin ding, *e.g.*, oxygen and hydrogen to combine i er, there would be a certain natural order in ag with it. But this conception is one which now repudiates. The tendency of oxygen to combine with hydrogen is not an inherent property, it is determined by antecedents, and depends on relations apart from those elements. Decomposition, we know, will not take place except under certain conditions. Now, when vitalisation of another portion of matter ensues upon such decomposition, may not the possibility of this vitalisation be precisely the condition which allows or determines the decomposition? Let me take what I consider an analogous case. In a heated body, let me suppose (I think it is in such sense true as to serve the purpose of the illustration) there is a tendency of the particles, which the heat has separated, to approximate to one another, *i.e.*, a tendency of the body to contract (on cooling). But this contraction cannot take place if the heat cannot be radiated. The condition for the contraction is that there shall be some body to which the expansion-producing (or the contraction-controlling) principle (the heat) can be passed on—some cooler body, in a word, within a certain distance. As the one body expands the other contracts; but which comes first,

the contraction of the cooling body, or the radiation—the transit—of the heat? To me it seems that this question goes deep into the most recondite questions of molecular physics; but in the representation of vital action as "produced by" decay, is it not quietly assumed that the cooling, or contraction, stands as cause?

I grant that when we take parallels of another sort, as, *e.g.*, a clock moved by weights, the order seems simple enough. The hands move, &c., *because* the weights fall, and the weights fall because of their gravity, and so on. But we must remember there is no gravity except as a result of conditions. Will the weights fall if the hands cannot move? Or take the simpler case of the balance. Suppose it in equilibrium; two changes will equally set it in motion, increase or diminution of weight in one scale. The raised condition must be imparted—transferred—or it cannot cease. It may be said, indeed, sever the connection of the scales, and the one will fall and the other will not rise; but something else will rise, or undergo some change equivalent to rising. The law is not altered, but only its particular application. The fall is seen, while the rising escapes our vision. We must be on our guard here lest the particular character and limitations of our experience deceive us, bringing, as it does, before us so preponderating a number of instances in which the downward process is the prominent one, the upward secret or out of reach.

But that the order of our experience must not be relied upon is evident from the fact that it differs in different cases, and in each produces on our minds the same impression, although mutually contradictory, of "natural tendencies," and of the beginning being in reality where it seems to be. So from the inorganic world we derive, from preponderance of instances, the impression that the

downward process comes first, and we suppose gravity, chemical affinity, and so on accordingly. But from the organic world we receive the impression of the correlative, or upward, processes coming first; the decay is hidden; there is the seemingly spontaneous vitalisation, warmth, activity. Accordingly, w[illegible] invented life, or vital force, as a primarily e[illegible] power. But in what respects do these two cl[illegible] ideas differ? On what firmer basis stands g[illegible]an vitality — chemical affinity than the "orgar[illegible]uence"? In each case we have simply put up [illegible] thing what comes first to us, what our particul[illegible] to the series of phenomena suggests as prima[illegible]e starting-point.

Now, doubtless these t[illegible]site conceptions have to be brought into harmony, and here appears to me to be one chief value of the recognition of the connection between nutrition and decay; it brings into unity our fundamental conceptions in respect to organic and inorganic nature. But let us observe: this unity is obtained through interpreting the organic by the inorganic. Doubtless the phenomena may be marshalled intelligibly (up to a certain point) in this order. If we assume the unintelligible points in the inorganic world as granted, we may bring the phenomena of life into unity with its phenomena; but then we must remember that we do assume these unintelligible data. We are haunted still by those dim ghosts of gravity and chemical affinity and the like, and listen in vain for the cock-crowing that is to banish them. I do not know, indeed, that the flash that seemed to promise so fair an illumination does not make the darkness around us more painfully visible.

But perhaps there is a different plan. We try interpreting the near, the better known, the living world, by that far off, dimly apprehended one, which we call dead,

and we find that to a certain point we can succeed. But if we can succeed *so*, cannot we succeed also the other way? How if we could interpret—they being proved the same—the dead by the living? May not the vital force, after all, give us a better key to chemical affinity than chemical affinity gives to vital force, and leave us finally not standing spell-bound before a *caput mortuum* of inconceivable attractions and repulsions, but face to face in presence of a power plastic to the intellect and cognate to the soul.

Let us for the present avoid, or at least defer, the phenomena of gravity, not denying, in the meantime, that they present special difficulties. But it seems to me that from the point of view above suggested the phenomena of the so-called chemical affinity appear in a fresh and less hopeless light. Take, on the one hand, oxygen and hydrogen, and on the other, water. It is evidently an incomplete statement to say that the latter "consists of" the former. An essential part of the phenomena is thus ignored. For oxygen and hydrogen will combine and form water only on the giving out of a large quantity of heat, *i.e.*, of *force*. The two gases are water *plus* force, and water represents the gases *minus* force, for they cannot be obtained from it except by the addition of the same amount of force that they gave out in uniting.

Now, this relation which exists between oxygen and hydrogen in the form of gas, and their equivalent of water, evidently is traceable throughout the entire domain of chemistry. In relation to chemical phenomena, all substances may be classified in one of two groups—as having force present with them, or as not having it. Not that such classification perhaps ever ceases to be relative; but it is, for this reason, none the less real. For example, oxygen and sodium contain force, which soda does not;

so, too, carbon and oxygen contain force, which carbo
acid does not; but soda and carbonic acid contain fo
which carbonate of soda does not. But I take it t
neither this relativity nor any doubtful points of detail
the least degree obscures the general distinction; whi
indeed, in a more limited scope, has been laid down
Professor Graham as ob ing between the crystall
and colloid groups, and hich is obvious enough
between hot bodies and c ones, charged and uncharg
nonconductors of electri , and so on. We take, th
water on the one hand, oxygen and hydrogen on
other, to stand to us epresentatives of the wh
domain of chemistry. sidered substantially, they
one; the water expresse ie condition of the substa
without (a certain kind and degree of) force; the ga
present the same substance *with* that force. Now, wh
is the simple statement of the phenomena given in t
formation of water? This surely: under certain c
ditions (say an electric spark coming into relation w
the gases) the force is "transmitted," ceases to be in the
and begins to be in something else, and coincidently t
substance is found in the condition which it has in t
absence of the force (water).

Here arises evidently the same question as that whi
I raised before: which comes first in thought-order, t
transmission of the force, or the alteration of conditi
of the substance? Is not the balance of reason on t
side of the former? To say of force that it is transmitt
or transmits itself, what is it but to say that it is fo
—that motion is motion, and exists in its movemen
It is the nature of motion to be transmitted to whatsoe
that is capable of moving comes into relation with
That force should be transmitted at whatsoever opp
tunity occurs, is but saying in other words that moti
takes the direction of least resistance.

Our thoughts may be helped here by referring to another form of chemical process—the galvanic current. Chemical action, as we say, is set up on union of the poles; but what is the union of the poles but making a passage for the "easier transmission of force;" in a word, presenting a direction of less resistance? Then, when the force which is in the zinc and sulphuric acid can be transmitted, the substance presents itself in the condition which it has in the absence of force (sulphate of zinc). Now, are not the production of water on application of an electric spark and the production of sulphate of zinc on union of the poles of a battery analogous dynamic processes? Is not the presentation of a direction of less resistance to the force the determining moment in each instance, and is not this change in the relation of the force the true dynamic process?

If so, then what follows is, that we have no need to assume any chemical affinities; the apparent change of substance is a passive phenomenon; it expresses simply the law that force cannot at once be and not be in the same place.

I would add only, in respect to life, the question, whether the "conditions of decay"—the heat, moisture, air—be not rather, in truth, the conditions of the transmission of force. Then, when the force is transmitted, whether to the surrounding air, as heat, in which case no life results, or to other particles, making them living, alike decomposition ensues; the recurrence of the state in which the force thus transmitted is no longer present.

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